SAMSUNG

DIGITAL VERSATILE DISC PLAYER

DVD-907/927

SERVICE Manual

DIGITAL VERSATILE DISC PLAYER

DVD-907

DVD-927

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1. Precautions

1-1 Safety Precautions

1. Before returning an instrument to the customer, always make a safety check of the entire instrument, including, but not limited to, the following items:

(1) Be sure that no built-in protective devices are defective or have been defeated during servicing. (1)Protective shields are provided to protect both the technician and the customer. Correctly replace all missing protective shields, including any remove for servicing convenience. (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including, but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning.

(2) Be sure that there are no cabinet openings throught which adults or children might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to, excessively wide cabinet ventilation slots, and an improperly fitted and/or incorrectly secured cabinet back cover.

(3) Leakage Current Hot Check-With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use a isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards institute(ANSI) C101.1 Leakage Current for Appliances and Underwriters Laboratories (UL) 1270 (40.7). With the instrument's AC switch first in the ON position and then in the OFF position, measure from a known earth ground (metal waterpipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle brackets, metal cabinets, screwheads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis.

Any current measured must not exceed 0.5 millamp. Reverse the instrument power cord plug in the outlet and repeat the test. See Figure 1-1.

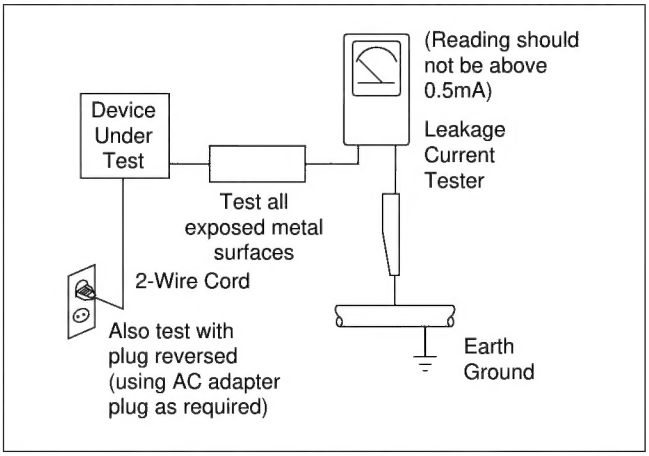

(Reading should not be above 0.5mA)
Device Under Test
Leakage Current Tester
Test all exposed metal surfaces
2-Wire Cord
Also test with plug reversed (using AC adapter plug as required)
Earth Ground

Fig. 1-1 AC Leakage Test

Any measurements not within the limits specified herein indicate a potential shock hazard that must be ellminated before returning the instrument to the customer.

(4) Insulation Resistance Test Cold Check-(1) Unplug the power supply cord and connect a jumper wire between the two prongs of the plug. (2) Turn on the power switch of the instrument. (3) Measure the resistance with an ohmmeter between the jumpered AC plug and all exposed metallic cabinet parts on the instrument, such as screwheads, antenna, control shafts, handle brackets, etc. When an exposed metallic part has a return path to the chassis, the reading should be between 1 and 5.2 megohm. When there is no return path to the chassis, the reading must be infinite. If the reading is not within the limits specified, there is the possibility of a shock hazard, and the instrument must be repared and rechecked before it is returned to the customer. See figure 1-2.

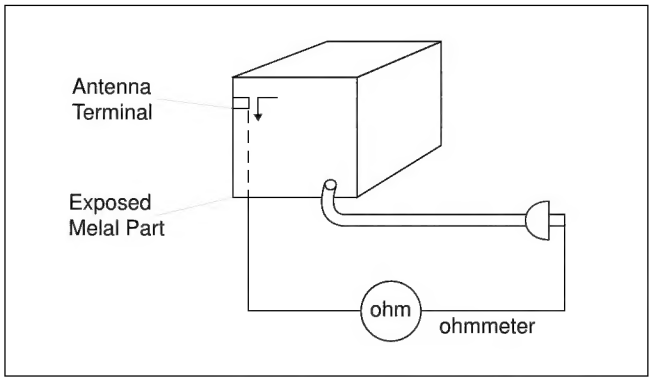


Fig.1-2 Insulation Resistance Test

2. Read and comply with all caution and safety related notes non or inside the cabinet, or on the chassis.

3. Design Afteration Warning-Do not alter of add to the mechanical or electrical design of this instrument. Design alterations and additions, including but not limited to, circuit modifications and the addition of items such as auxiliary audio output connections, might alter the safety characteristics of this instrument and create a hazard to the user. Any design alterations or additions will make you, the servicer, responsible for personal injury or property damage resulting therefrom.

4. Observe original lead dress. Take extra care to assure correct lead dress in the following areas:(1) near sharp edges, (2) near thermally hot parts (be sure that leads and components do not touch thermally hot parts), (3) the AC supply, (4) high voltage, and (5) antenna wiring. Always inspect in all areas for pinched, out-of-place, or frayed wiring, Do not change spacing between a componect and the printed-circuit board. Check the AC power cord for damage.

5. Components, parts, and/or wiring that appear to have overheated or that are otherwise damaged should be replaced with components, parts and/or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

6. Product Safety Notice-Some electrical and mechanical parts have special safety-related characteristics which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified by shading, an (∗)or a (⚠)on schematisc and parts lists. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part might created shock, fire and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate.

1-2 Servicing Precautions

CAUTION: Before servicing Instruments covered by this service manual and its supplements, read and follow the Safety Precautions section of this manual.

Note: If unforseen circument create conflict between the following servicing precautions and any of the safety precautions, always follow the safety precautions. Remember: Safety First.

1-2-1 General Servicing Precautions

(1) a. Always unplug the instrument's AC power cord from the AC power source before (1) removing or reinstalling any component, circuit board, module or any other instrument assembly, (2) disconnecting any instrument electrical plug or other electrical connection, (3) connecting a test substitute in parallel with an electrolytic capacitor in the instrument.

b. Do not defeat any plug/socker B+ voltage interlocks with which instruments covered by this service manual might be equipped.

c. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.

d. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.

Note: Refer to the Safety Precautions section ground lead last.

(2) The service precautions are indicated or printed on the cabinet, chassis or components. When servicing, follow the printed or indicated service precautions and service materials.

(3) The components used in the unit have a specified flame resistance and dielectric strength. When replacing components, use components which have the same retings. Components identified by shading, by(⋇) or by (⚠) in the circuit diagram are important for safety or for the characteristics of the unit. Always replace them with the exact replacement components.

(4) An insulation tube or tape is sometimes used and some components are raised above the printed wiling board for safety. The internal wiring is sometimes clamped to prevent contact with heating components. Install such elements as they were.

(5) After servicing, always check that the removed screws, corponents, and wiring have been installed correctly and that the portion around the serviced part has not been damaged and so on. Further, check the insulation between the blades of the attachment plug and accessible conductive parts.

1-2-2 Insulation Checking Procedure

Disconnect the attachment plug from the AC outlet and turn the power ON. Connect the insulation resistance meter (500V) to the blades of the attachment plug. The insulation resistance between each blade of the attachment plug and accessible conductive parts(see note) should be more than 1 Megohm.

Note: Accesible conductive parts include metal panels, input terminals, earphone jacks, etc.

1-3 ESD Precautions

Electrostatically Sensitive Devices (ESD)

Some semiconductor (solid state) devices can be damaged easily by static electricity.
Such components commonly are called Electro statically Sensitive Devices(ESD). Examples of typical ESD devices are integrated circuits and some fieldeffect transistors and semiconductor chip components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

(1) Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic aharge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.

(2) After removing an electrical assembly equipped with ESD devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.

(3) Use only a grounded-tip soldering iron to solder or unsolder ESD devices.

(4) Use ouly an anti-static solder removal devices. Some solder removal devices not classified as “anti-static” can generate electrical charges sufficient to damage ESD devices.

(5) Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damge ESD devices.

(6) Do not remove a replacement ESD device from its protective package until immediately before your are ready to install it.(Most replacement ESD devices are packaged with leads electrically shorted together by condutive foam, aluminum foil or comparable conductive materials).

(7) Immediately before removing the protective materials from the leads of a replacement ESD device, touch the protective material to the chassis or circuit assembly into which the device will be installed.

CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.

(8) Minimize bodily motions when handling unpackaged replacement ESD devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electrictity suffcient to damage an ESD device).

1-4 Handling the optical pick-up

* The laser diode in the optical pick up may suffer electrostatic breakdown because of potential static electricity from clothing and your body.

The following method is recommended.

(1) Place a conductive sheet on the work bench (The black sheet used for wrapping repair parts.)
(2) Place the set on the conductive sheet so that the chassis is grounded to the sheet.
(3) Place your hands on the conductive sheet(This gives them the same ground as the sheet.)
(4) Romove the optical pick up block
(5) Perform work on top of the conductive sheet. Be careful not to let your clothes or any other static sources to touch the unit.

* Be sure to put on a wrist strap grounded to the sheet.
* Be sure to lay a conductive sheet made of copper etc. Which is grounded to the table.

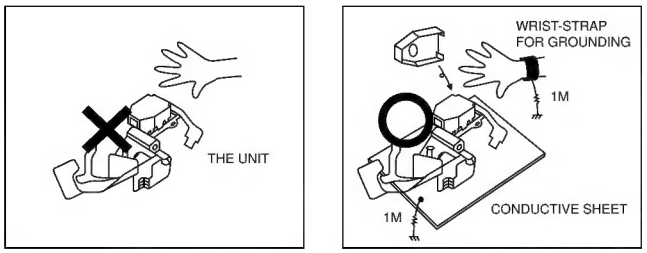


Fig.1-3

(6) Short the short terminal on the PCB, which is inside the Pick-Up ASS'Y, before replacing the Pick-Up. (The short terminal is shorted when the Pick-Up Ass'y is being lifted or moved.)
(7) After replacing the Pick-up, open the short terminal on the PCB.

1-5 Pick-up disassembly and ressembly

1-5-1 Disassembly

1) Remove the power cable.
2) Switch LD SW3 on deck PCB to 'S' before removing the FPC
   (inserted into Main PCB CN1. See Fig 1-4.)
3) Disassemble the deck.
4) Disassemble the deck PCB.
5) Replace the Pick-up.

1-5-2 Assembly

1) Replace the Pick-up.
2) Assemble the deck PCB.
3) Reassemble the deck.
4) Switch LD SW3 on deck PCB to 'O' and insert FPC into Main PCB CN1 (See Fig 1-4).

Note : If the assembly and disassembly are not done in correct sequence, the Pick-up may be damaged.

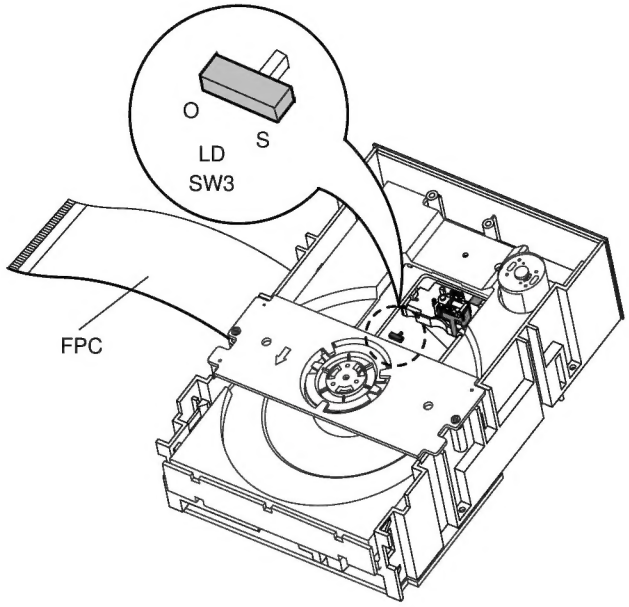


Fig. 1-4

2. Reference Information

2-1 Semiconductor Base Diagram

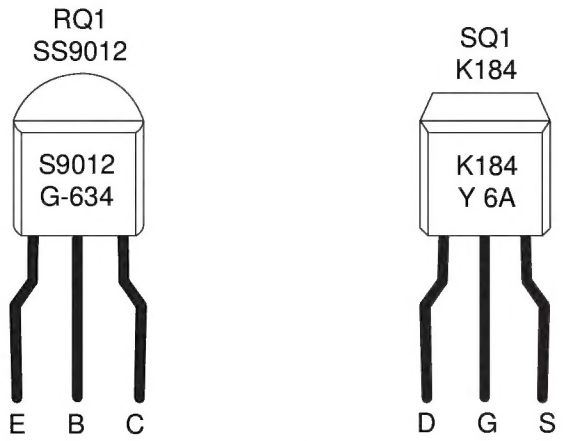


Fig. 2-1

2-2 Chip Replacement

2-2-1 Precaution for the chip Replacement

1) Do not touch the part body directly with the soldering iron. ICs, especially TSOP, are easily damaged by heat.
2) Use care regarding soldering iron tip and avoid repidly heating parts. Some parts can be damaged by sudden heating. Preheat the part at about 100°… for several minutes before installing it.
3) Use soldering tip temperature of about 240°… or larger parts, use a slightly higher temperature (about 280°…).
4) The thin(0.3mm)solder for miniature parts does not contain adequate flux. Supplementary flux is thus needed in most cases.
5) Use care not to damage the circuit pattern, especially when removing.
6) Because of the many pins, cleanliness of the pattern is extremely important after removing the IC.
7) Use care to avoid solder bridges. Remove any that occurs.
8) Position the part carefully. They will also affect the soldering operation. Be very precise in positioning the IC. Soldering opposite pins first holds the IC in place and makes soldering the other pins easier.
9) Do not reuse removed parts.
10) Check for solder joints, especially miniature parts with small lead.
11) A defective trimming resistor cannot be adjusted externally. Replace with an ordjnary variable resistor.
12) It is important to inspect the work with a magnifier. Check after installing (cold solder joints, etc.).

2-2-2 Tools for the Chip Replacement

The tools for the chip replacement are as follows:

1) Thin tip type soldering iron
2) Small flat-blade tip-type soldering iron
3) Special desoldering tip iron
4) Airblower unit
5) Flat Package Pick-up
6) Flux can be cleaned by water
7) 0.3mm thin solder can be cleaned by water
8) Desoldering wire
9) Tweezers

2-2-3 Chip Resistors and Chip Capacitors

-- Kind of the Part

The kind of chip resistors and chip capacitors as follows:d

1) Think Film Chip Resistors
2) Carbon Film Chip Resistors
3) Metal Film Chip Resistors
4) Chip Ceramic Capacitors
5) Chip Trimming Resistors

-- Removing the Part

1) Using two soldering irons:
   Use thin tip soldering irons.
① Use soldering tip temperature of about 280°….
② Simultaneously heat both ends of the part.
③ While heating, grasp the part with the tips of the
④ soldering irons and remove it.
   Use desoldering wire to completely remove the old
⑤ solder from the part location of the board.
   A clean pattern for installing the new part is very
⑥ important.

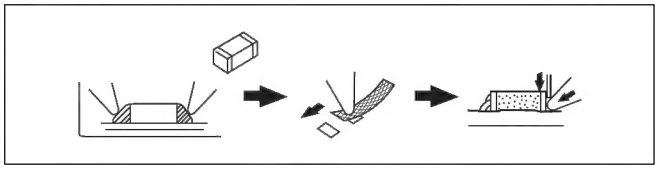


Fig 2-2

-- Installing the Part

1) Use desoldering wire to remove the previous solder.
2) Clean the location.
3) Apply flux.
4) Position the IC and solder two pins at opposite sides.
5) Use a sharp tipped soldering iron and carefully solder each Pin.(After gaining experience, a thicker tip can be used for better work efficiency.)
6) Remove any solder bridges with desoldering wire.
7) Inspect the work with a magnifier.

2-2-4 Diodes and Tr.

-- Kind of the Part
The kind of the part is as follows:
1) Chip VRs.
2) Chip Trimmer Capacitors
3) Diode
4) Transistors

-- Removing the Part
1) Using two soldering irons:
① Use small flat-blade tips.
② Heat the leads of the part simultaneously.
③ When the solder melts, grasp and remove the part with the soldering iron tips.
④ Remove the old solder with desoldering wire.

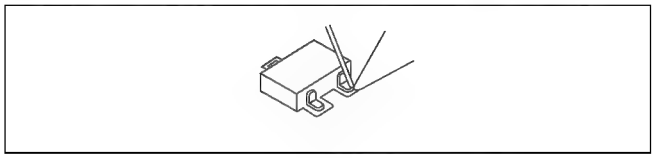


Fig 2-3

-- Installing the Part
1) Clean the area where the new part is to be mounted.
2) Apply flux.
3) Set part correctly into position, prevent it from shifting.
4) Use sharp soldering iron tip. Bring close to the part contact without actually touching it. Melt thin solder between the tip and part si that it flows into the part contact.

2-2-5 Chip ICs

-- The kind of the Chip ICs
The kind of the chip ICs are as follows:
1) SOP(Small Outline Package)IC
2) SSOP(Shrink Small Outline Package)IC
3) VSOP(Very Small Outline Package)IC
4) QFP(Quad Flat Package)IC
5) VQFP(Very Quad Flat Package)IC
6) PLCC(Plastic Leaded Chip Carrier)IC
7) TSOP(Thin Small Outline Package)IC

-- Removing the Part
1) Using special desoldering iron:
① Selet the tip according to the size and shape of the IC.
② "Tin" the tip with a small amount of the IC leads.
③ Set the tip squarely over the IC leads.
④ When the solder melts, carefully twist the iron.
⑤ Raise and remove the IC.

2) Using shaped airblower unit:
① Select the correct nozzle.
② Select the temperature and airblow(suggested: temperature:7, airblow:4)
③ Engage the IC removing tool.
④ Use the airblow to preheat the IC for about 5 seconds, then heat with the nozzle until the IC remover lifts the part from the board.

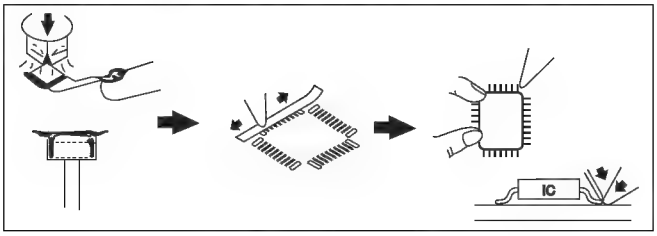


Fig 2-4

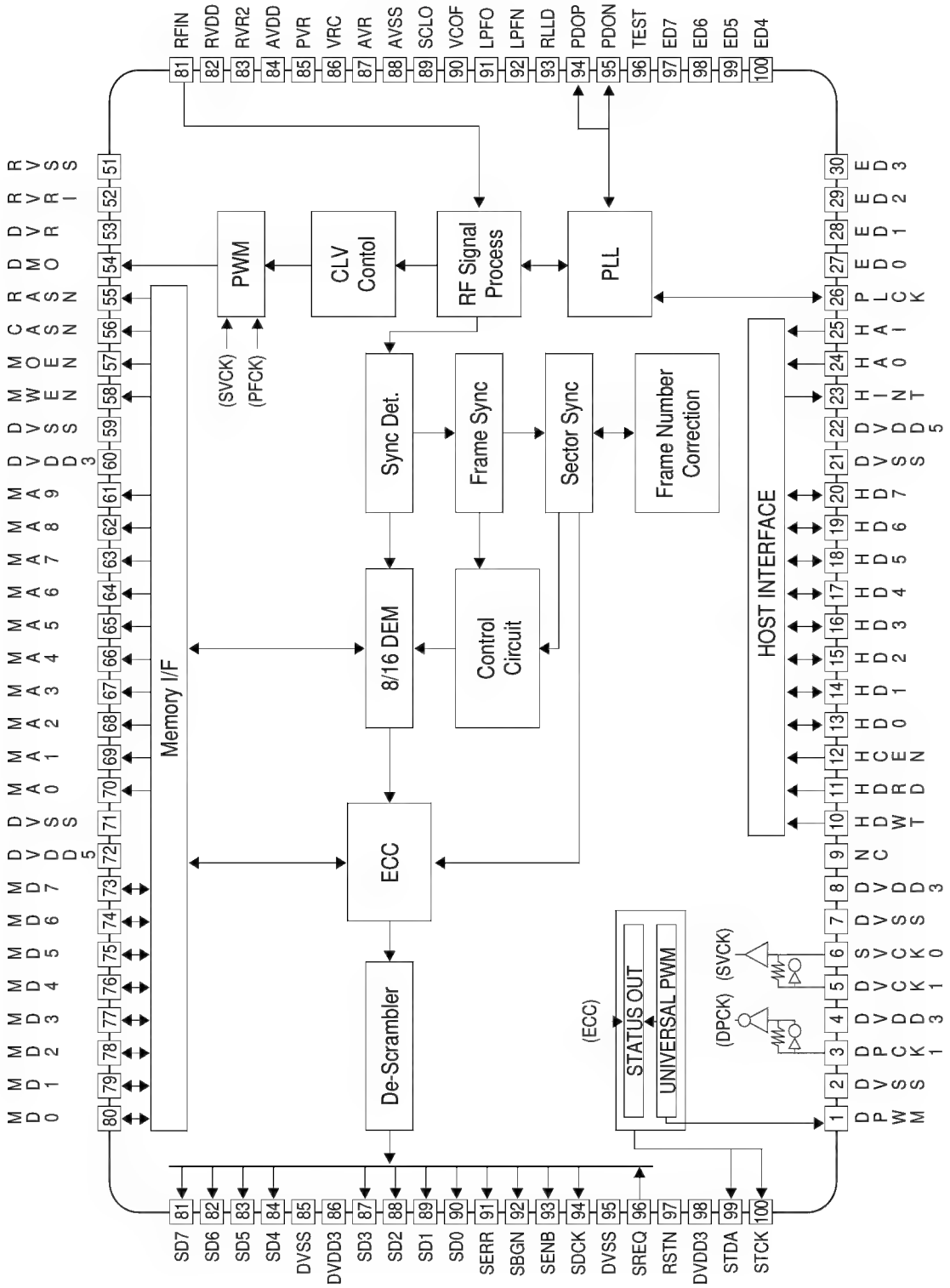
-- Installing the Part
1) Use desoldering wire to remove the previous solder.
2) Clean the location.
3) Apply flux.
4) Position the IC and solder two pins at opposite sides.
5) Use a sharp tipped soldering iron and carefully sol der each Pin.(After gaining experience, a thicker tip can be used for better work efficiency.)
6) Remove any solder bridges with desoldering wire.
7) Inspect the work with a magnifier.

MEMO

6. IC Descriptions

6-1 DVD DATA PROCESSOR
TC90A19F
DIC1

BLOCK DIAGRAM



PIN ASSIGNMENT

PIN	NAME	FUNCTION
1	UPWM	Wide use PWM output
2	DV_{SS1}	Digital ground
3	DPCKI	Signal process reference clock input (27 to 34MHz)
4	DVDD1	Digital power supply (3.3V)
5	SVCKI	Servo reference clock input (oscillation circuit input)
6	SVCKO	Servo reference clock output (oscillation circuit input)
7	DV_{SS1}	Digital ground
8	DV_{DD1}	Digital power supply (3.3V)
9	WAIT	Waiting
10	HDWT	MPU WRITE signal input
11	HDRD	MPU READ signal input
12	HCEN	MPU chip selection
13	HD0	MPU data bus I/O
14	HD1	MPU data bus I/O
15	HD2	MPU data bus I/O
16	HD3	MPU data bus I/O
17	HD4	MPU data bus I/O
18	HD5	MPU data bus I/O
19	HD6	MPU data bus I/O
20	HD7	MPU data bus I/O
21	DV_{SS2}	Digital ground
22	DV_{DD2}	Digital power supply
23	HINT	MPU interruption signal output (interruption:L)
24	HA0	MPU address bus input
25	HA1	MPU address bus input
26	PLCK	VCO oscillation clock I/O
27	ED0	Extension data bus I/O
28	ED1	Extension data bus I/O
29	ED2	Extension data bus I/O
30	ED3	Extension data bus I/O
31	ED4	Extension data bus I/O
32	ED5	Extension data bus I/O
33	ED6	Extension data bus I/O

PIN	NAME	FUNCTION
34	ED7	Extension data bus I/O
35	TEST	Test mode input
36	PDON	Phase error signal output(- polarity)
37	PDOP	Phase error signal output(+polarity)
38	TMAX	RLL detecting result output
39	LPFN	Inverting input for PLL loop filter amplifier
40	LPFO	Output for PLL loop filter amplifier
41	VCOF	VCO filter output
42	SLCO	DAC output for making data slice level
43	AV_{SS}	Analog ground
44	AVR	Non PLL system analog reference voltage (1.65V)
45	VRC	Resistor dividing point electrical potential output(for analog reference electrical potential generation)
46	PVR	PLL system analog reference voltage output(1.65V)
47	AVDD	Analog power supply (3.3V)
48	RVR2	Second reference voltage(for connecting capacitor)
49	RV_{DD}	For power supply
50	RFIN	RF signal input
51	RV_{SS}	For ground
52	RVR1	First reference voltage (for connecting capacitor)
53	DVR	DMO reference voltage input (2.1V)
54	DMO	Disc equalizer output (3 value PWM +Hiz) for DVD
55	RASN	External RAM row address selection (negative logic)
56	CASN	External RAM column address selection (negative logic)
57	MOEN	External RAM output acknowledgement signal output
58	MWEN	External RAM READ/WRITE selection
59	DV_{SS1}	Digital ground
60	DV_{DD1}	Digital power supply
61	MA9	External RAM address bus output
62	MA8	External RAM address bus output
63	MA7	External RAM address bus output
64	MA6	External RAM address bus output
65	MA5	External RAM address bus output

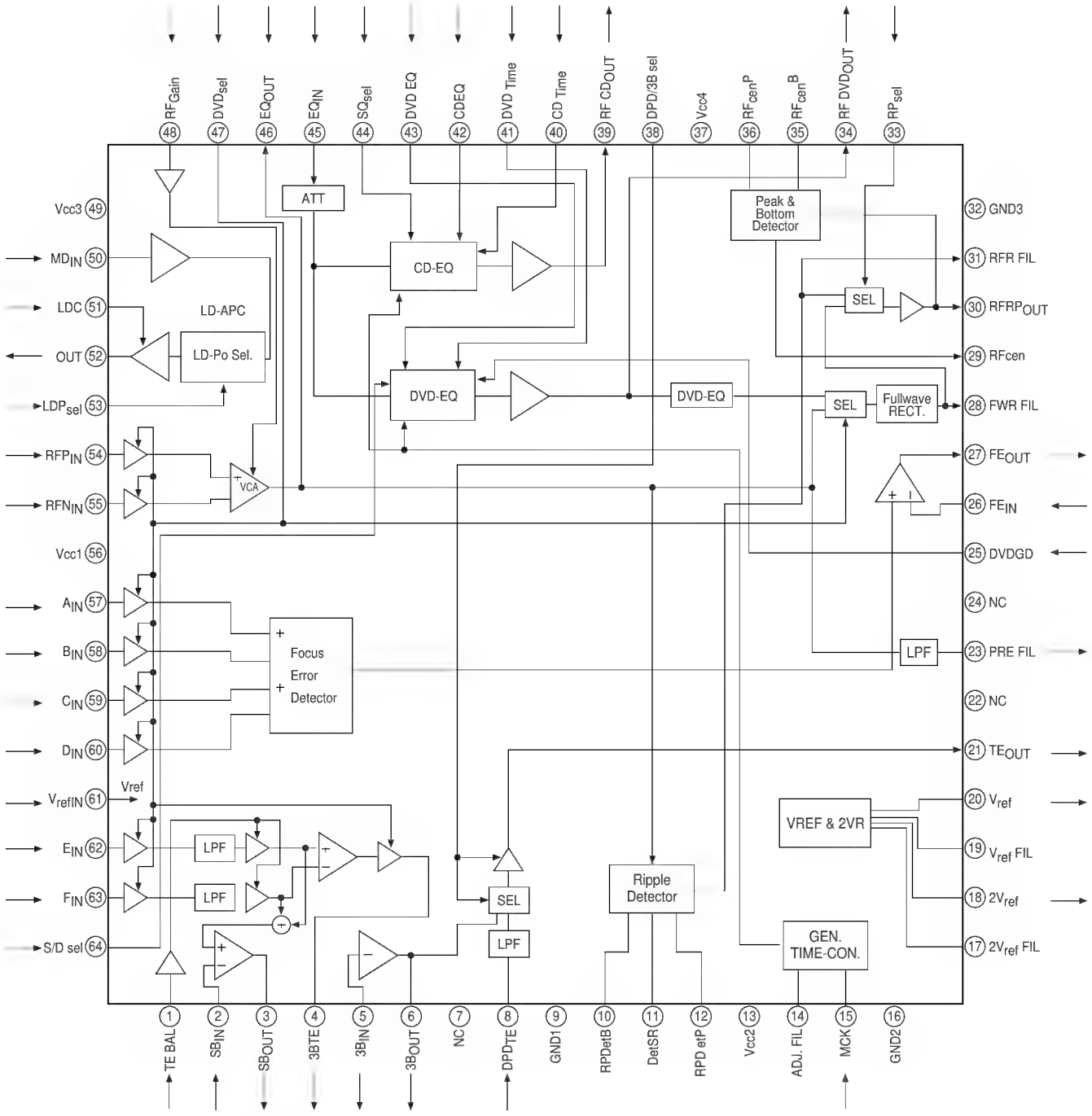
PIN ASSIGNMENT

PIN	NAME	FUNCTION
66	MA4	External RAM address bus output
67	MA3	External RAM address bus output
68	MA2	External RAM address bus output
69	MA1	External RAM address bus output
70	MA0	External RAM address bus output
71	DV_{SS2}	Digital ground
72	DV_{DD2}	Digital power supply
73	MD7	External RAM data bus I/O
74	MD6	External RAM data bus I/O
75	MD5	External RAM data bus I/O
76	MD4	External RAM data bus I/O
77	MD3	External RAM data bus I/O
78	MD2	External RAM data bus I/O
79	MD1	External RAM data bus I/O
80	MD0	External RAM data bus I/O
81	SD7	MPEG data output
82	SD6	MPEG data output
83	SD5	MPEG data output
84	SD4	MPEG data output
85	DV_{SS1}	Digital ground
86	DV_{DD1}	Digital power supply
87	SD3	MPEG data output
88	SD2	MPEG data output
89	SD1	MPEG data output
90	SD0	MPEG data output

PIN	NAME	FUNCTION
91	SERR	MPEG data reliability flag output (data error:L)
92	SBGN	MPEG output secter synchronous signal output (secter top:L)
93	SENB	MPEG data effective flag output (effective:L)
94	SDCK	MPEG data transfer clock output
95	DV_{SS1}	Digital ground
96	SREQ	MPEG data request flag input(request:L)
97	RSTN	Hard reset input (reset:L)
98	DV_{DD1}	Digital power supply
99	STDA	Operation monitor data output (Output is carried out in synchronization with the falling edge of SDCK)
100	STCK	Operation monitor synchronous signal output (data top bit:L)

6-2 RF IC
TA1236F
RIC1

BLOCK DIAGRAM



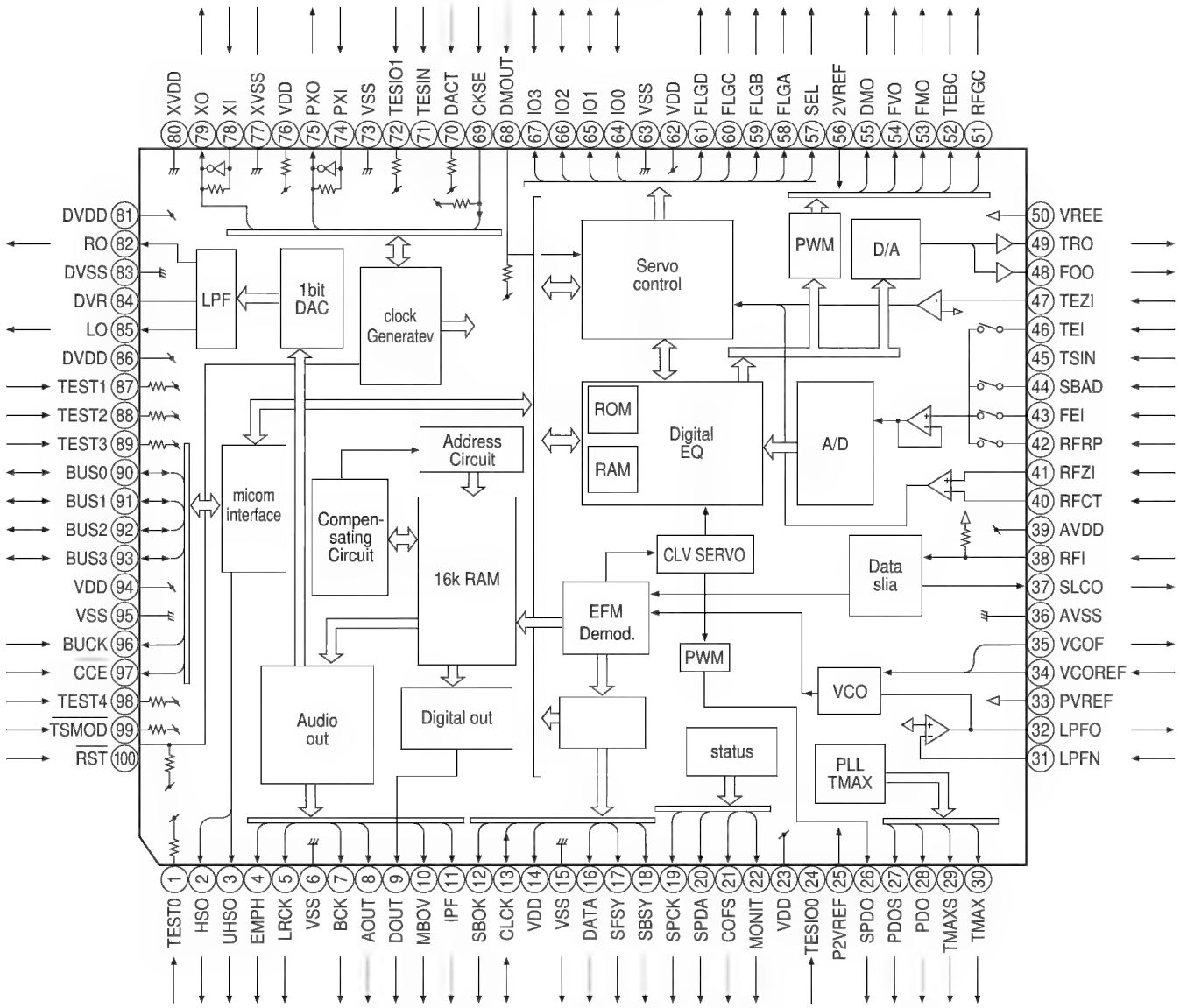
PIN ASSIGNMENT

PIN	NAME	FUNCTION
1	TEB	Control input to change sub beam subtraction ratio at-3beam system tracking error(TE)generation
2	SBI	Inverting input for sub-beam summing amplifier
3	SBAD	Sub-beam summing amplifier output
4	3BTE	3 beam TE signal intermediate output
5	3BIN	Amplifier inverting input for 3 beam TE level adjustment
6	3BO	Amplifier output for 3 beam TE level adjustment
7	N.C.	No connection
8	TE1B	DPD system TE signal input
9	GNDSV	Servo system ground
10	RFB	RF ripple datector
11	DETR	RF ripple datector
12	RFP	RF ripple datector
13	V_{CCD}	Power supply
14	ADJF	Filter external capacitor for DVD-EQ time constant compensation
15	MCK	Clock input for DVD-EQ time constant compensation
16	GNDD2	Ground
17	2CVR	Reference voltage smoothing external capacitor
18	2VR	Reference voltage twice output
19	CVR	Reference voltage smoothing external capacitor
20	V_{REF}	Reference voltage output
21	TEO	TE output after switching DPD/3B
22	N.C.	No connection
23	RFDEQ	Pre filter output for RF
24	N.C.	No connection
25	EQGD	Group delay characteristic control input for DVD-EQ
26	FEI	Inverting input for focus error(FE) signal output amplifier
27	FEO	FE output
28	3TF	Filter external capacitor to DVD-WV detecting signal
29	RFZC	Amplitude center voltage output of RF ripple signal
30	RFRP	RF ripple signal output
31	RPF	Filter external capacitor for RFRP signal
32	GNDRF	RF system ground

PIN	NAME	FUNCTION
33	RPS	Control input when selecting DVD-WV detecting signal for RFRP
34	SFSD	EQ output for DVD
35	RFZB	RFRP center level detection
36	RFZP	RFRP center level detection
37	V_{CC3}	Power supply for reference voltage
38	1B3B	Control input to select DPD or 3B for TE Signal
39	RFCD	EQ output for CD
40	CD	Frequency adjustment input for CD-EQ curve
41	TIME	Frequency adjustment input for DVD-EQ curve
42	CDF	Peak gain adjustment input for CD-EQ curve
43	FREQ	DVD-EQ curve peak gain adjustment Input
44	HSB	Normal/four times linear speed selecting input for CD-EQ
45	EQI	DVD/CD-EQ input
46	EQO	VCA passing Output for RFN and RFP
47	CD/SD	Selection control input for DVD-CD
48	RFG	Control input for RF signal VCA
49	V_{CCRF}	RF system power supply
50	MDI	Monitoring input for laser diode APC
51	LDC	ON/OFF control input for LD
52	LDO	External current driver control output for LD
53	LDP	Selection input for APC control polarity
54	RFP	RF signal non-inverting input from PU
55	RFN	RF signal inverting input from PU
56	V_{CC5V}	Servo system power supply
57	AI	Main beam four divisions detector A input for making focus error (FE)
58	BI	Main beam four divisions detector B input for making FE
59	CI	Main beam four divisions detector C input for making FE
60	DI	Main beam four divisions detector D input for making FE
61	V_{IRF}	2.1V reference voltage input
62	TNI	Sub-beam E input
63	TPI	Sub-beam F input
64	DBL	Single/double layer system selection input

6-3 SERVO & CD DATA PROCESSOR
TC9420F
SIC7

BLOCK DIAGRAM



PIN ASSIGNMENT

PIN	NAME	FUNCTION
1	TEST0	For test mode
2	/HSO	Playback speed mode flag ouput
3	/UHSO	Playback speed mode flag output
4	EMPH	Emphasis flag output of sub-code Q data(H:emphasis ON,L:emphasis OFF)
5	LRCK	Channel clock(44.1kHz)output
6	V_{SS}	Digital ground
7	BCK	Bit clock(1.4122MHz) output
8	AOUT	Audio data output
9	DOUT	Digital Out output
10	MBOV	Buffer memory over signal output
11	IPF	Compensation flag output
12	SBOK	CRCC judging result output of sub-code Q data(result OK:H)
13	CLCK	Clock I/O (for sub-code P to W data reading)
14	V_{DD}	Digital + power supply
15	V_{SS}	Digital ground
16	DATA	Sub-code P to W data output
17	SFSY	Playback system frame synchronous signal output or Servo system internal register data Read clock output
18	SBSY	Sub-code block synchronous output or Servo system internal register data latch pulse output
19	SPCK	Processor status signal Read clock (176.4kHz)output
20	SPDA	Processor status signal output
21	COFS	Correction system frame clock(7.35khz) output
22	MONIT	LSI internal signal monitor output
23	VDD	Digital + power supply
24	TESIO0	Test I/O
25	P2V_{REF}	2VREF terminal for PLL system
26	SPDO	VCO center frequency shift output
27	POOS	Phase difference signal output between EFM signal and PLCK signal (at 8 times speed operation)
28	PDO	Phase difference signal output between EFM signal and PLCK signal
29	TMAXS	TMAX detection result output
30	TMAX	TMAX detection result output
31	LPFN	Amplifier (for low pass filter) inverting input
32	LPFO	Amplifier (for low pass filter)output

PIN	NAME	FUNCTION
33	PV_{REF}	VREF terminal for PLL system
34	VCO$_{REF}$	VCO center frequency reference level
35	VCOF	Filter terminal for VCO
36	AV_{SS}	Analog system ground
37	SLCO	Data slice level making DAC output
38	RFI	RF signal input
39	AV_{DD}	Analog system power supply
40	RFCT	RFRT signal center level input
41	RFZI	RFRT zero cross input
42	RFRP	RF ripply signal input
43	FEI	Focus error signal input
44	SBAD	Sub-beam addition signal input
45	TSIN	Input terminal (in case of tracking of mode)
46	TEI	Tracking error input
47	TEZI	Input for tracking error, zero cross
48	FOO	Focus equalizer output
49	TRO	Tracking equalizer output
50	V_{REF}	Analog reference power supply
51	RFGC	RF amplitude adjustment control signal output
52	TEBC	Tracking balance control signal output
53	FMO	Feed equalizer output
54	FVO	Speed error signal of feed search EQ output
55	DMO	Disc equalizer output
56	2V_{REF}	Analog reference power sypply (2x V_{REF})
57	SEL	APC circuit ON/OFF signal output
58	FLGA	External floag output (for monitoring internal signal)
59	FLGB	External floag output (for monitoring internal signal)
60	FLGC	External floag output (for monitoring internal signal)
61	FLGD	External floag output (for monitoring internal signal)
62	V_{DD}	Digital + power supply
63	V_{SS}	Digital ground
64	IO0(FMOP)	Wide use I/O port
65	IO1(FMON)	Wide use I/O port

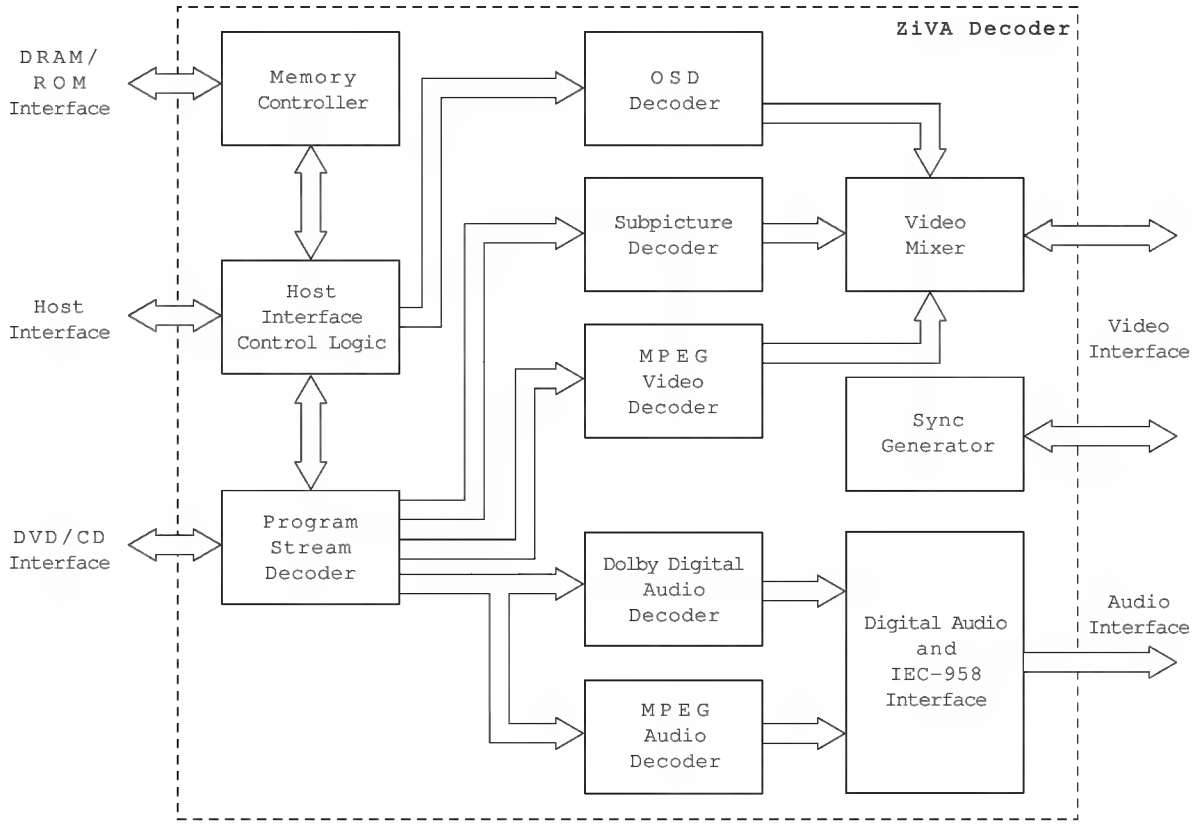
PIN ASSIGNMENT

PIN	NAME	FUNCTION
66	IO2(DMOP)	Wide use I/O port
67	IO2(DMON)	Wide use I/O port
68	/DMOUT	Mode setting to output binary PWM signals of field equalizer from IO0 and IO1 terminals and of disc equalizer from IO2 and IO3 terminals
69	/CKSE	X¡tal selection
70	/DACT	DAC test mode
71	TESIN	Test input (external VCO clock input)
72	TESIO1	Test I/O
73	V_{SS}	Digital ground
74	PXI	DPS system clock oscillation circuit input
75	PXO	DPS system clock oscillation circuit output
76	V_{DD}	Digital + power supply
77	XV_{SS}	Ground for system clock oscillation circuit
78	XI	System clock oscillation circuit input
79	XO	System clock oscillation circuit output
80	XV_{DD}	+ power supply for system clock oscillation circuit
81	DVDO	D/A converting section power supply
82	RO	R channel data forward rotation output
83	DV_{SS}	D/A converting section ground
84	DVR	D/A converting section reference voltage
85	LO	L channel data forward rotation output
86	DV_{DD}	D/A converting section power supply
87	TEST1	Test mode terminal
88	TEST2	Test mode terminal
89	TEST3	Test mode terminal
90	BUS0	Data I/O (for microcomputer interface)

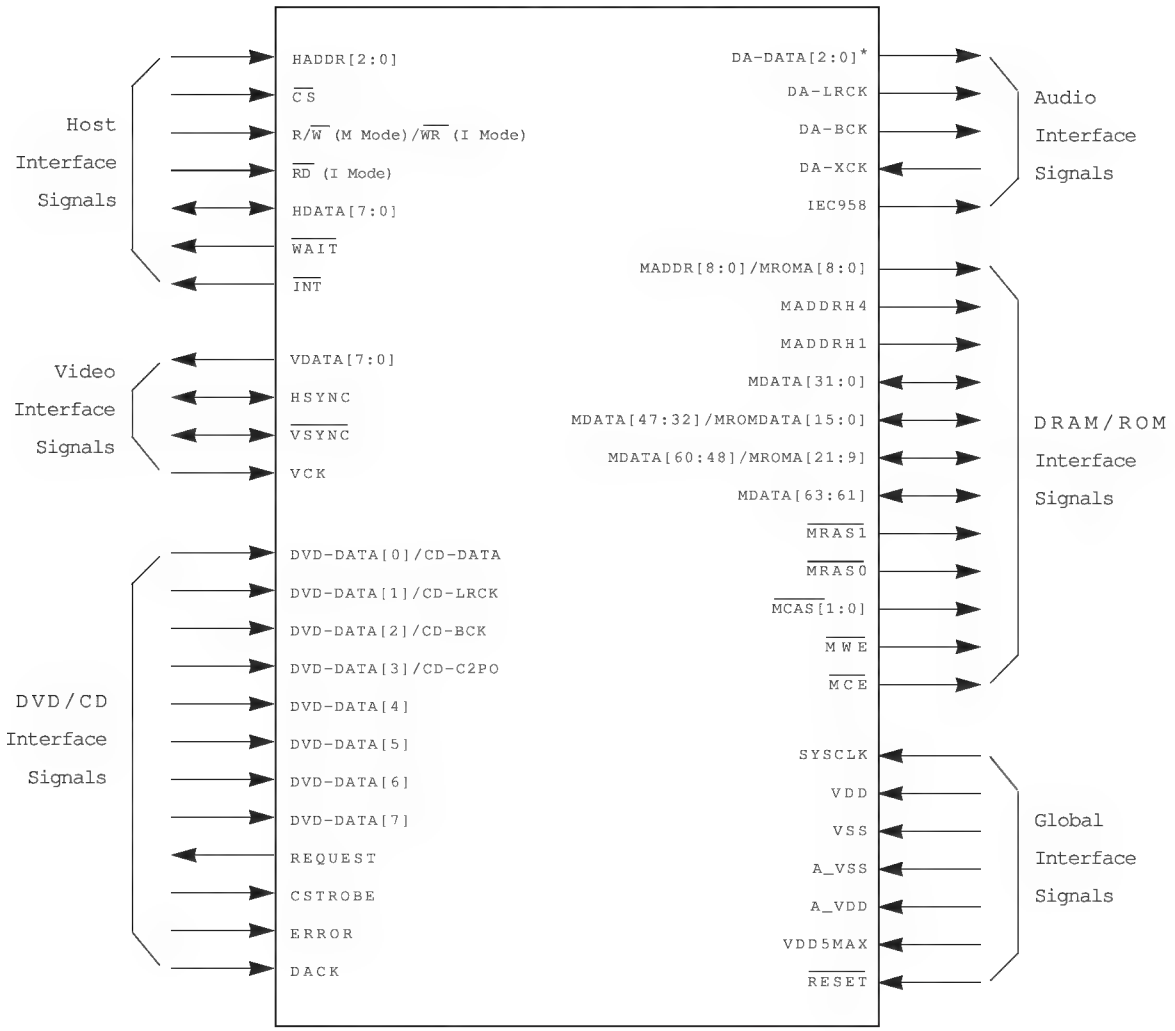
PIN	NAME	FUNCTION
91	BUS1	Data I/O (for microcomputer interface)
92	BUS2	Data I/O (for microcomputer interface)
93	BUS3	Data I/O (for microcomputer interface)
94	V_{DD}	Digital + power supply
95	V_{SS}	Digital ground
96	BUCK	Clock input for microcomputer interface
97	/CCE	Chip enable signal input for microcomputer interface
98	TEST4	Test mode terminal
99	/TSMOD	Local test mode selection
100	/RST	Reset signal input

6-4 AUDIO/VIDEO DECODER
ZiVA D6-L
BIC1

BLOCK DIAGRAM

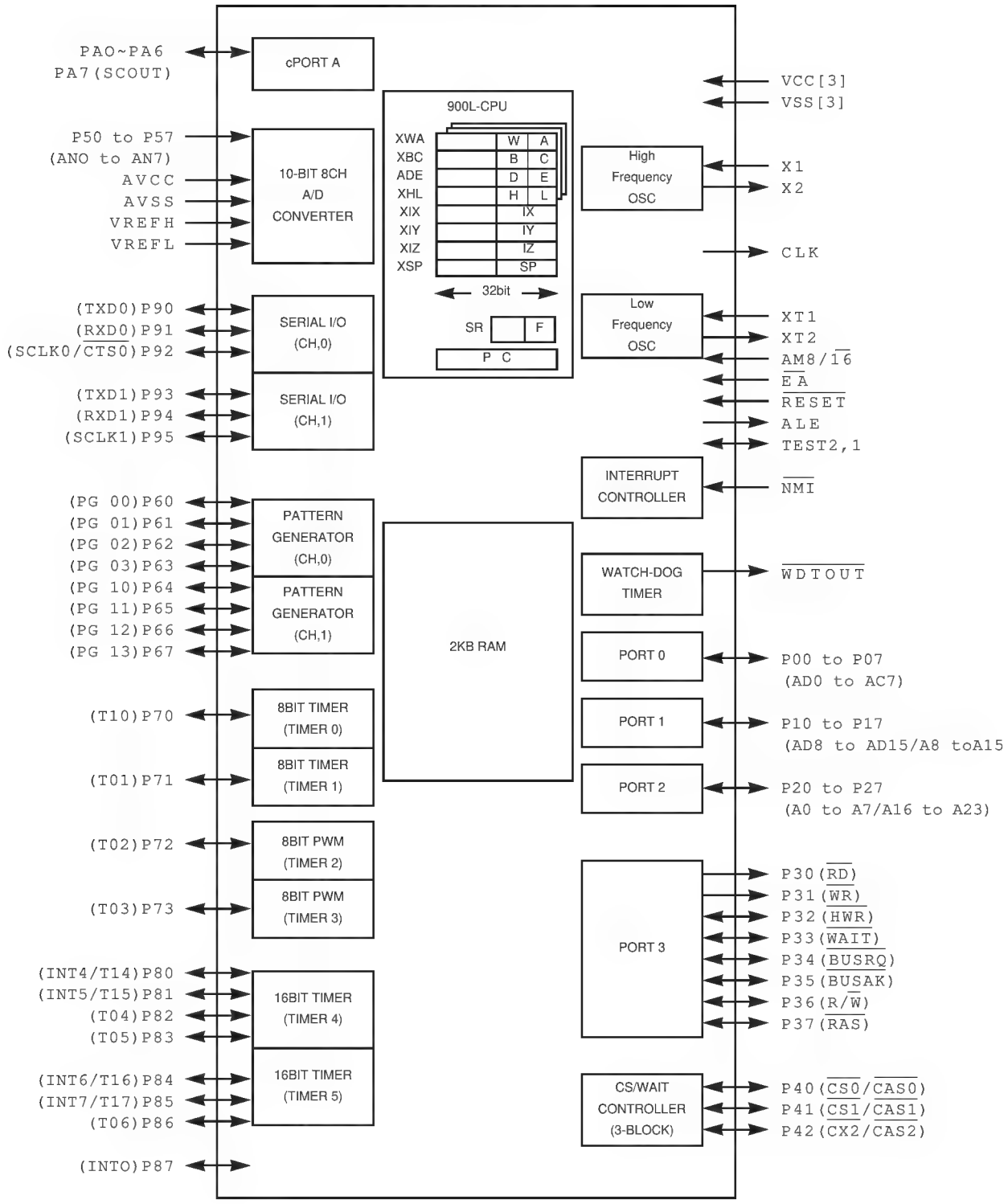


LOGIC DIAGRAM



6-5 MAIN MICOM
TMP93CS41
MIC1

BLOCK DIAGRAM



PIN ASSIGNMENT

PIN		I/O	NAME	FUNCTION
1		I	VREFL	Reference Voltage Input to A/DC(L¡)-
2		I	AVSS	GND pin for A/D Converter(0V)
3		I	AVCC	Power supply pin for A/D Converter
4	NMI	I	SRQ	Fromt Micom - -> Main Micom Request
5	P70	O	RRQ	Fromt Micom <- - Main Micom Request
6	P71	O	LDON	Laser On ("H"=on)
7	P72	O	SLEDOUT	Forward Slide Move
8	P73	O	SLEDIN	Reverse Slide Move
9	P80	I	SLEDFG	Hall Count Input
10	P81	O	DSPLT	Sony DSP Data Latch
11	P82	O	DIF2	AKM4324 Control("L"=16/20bit, "H"=24bit)
12	P83	O	ML1	Audio DAC Data Latch 1
13	P84	I	SBSY	SUBQ Block Sync. Signal INT.
14	P85	O	DVDINT	A/V Decoder INT.
15	P86	O	MRST	LSI Reset
16	P87	I	DPINT	Data Processor INT.
17	P90	O	TXD	Front Micom Trans. Data
18	P91	I	RXD	Front Micom Receive Data
19	P92	I	SCLK	Front Micom Communication Clock
20	P93	O	MD	Audio DAC Trans. Data
21	P94	O	ML2	Audio DAC Data Latch 2
22	P95	O	MC	Audio DAC Trans. Clock
23	AM8/16	I	AM8/16	8bit External Data Bus Width(H¡)-
24	CLK	O	CLK	Clock Output(System Clock/2)
25	Vcc	I	Vcc	Power Supply Pin(+5V)
26	Vss	I	Vss	GND Pin(0V)
27	X1	I	X1	20MHz
28	X2	O	X2	20MHz
29	EA	I	EA	TMP93CS41F:¡L¡-
30	Reset	I	RESET	Micom Rest Input

PIN		I/O	NAME	FUNCTION
31	P96	O	/CCE	Digital Servo Chip Enable
32	P97	O	BUCK	Digital Servo I/F Clock
33	Test1	O	TEST1	
34	Test2	I	TEST2	
35	PA0	I/O	BUS0	Digital Servo I/F Data 0
36	PA1	I/O	BUS1	Digital Servo I/F Data 1
37	PA2	I/O	BUS2	Digital Servo I/F Data 2
38	PA3	I/O	BUS3	Digital Servo I/F Data 3
39	PA4	O	RPSEL	Ripple Detect Output S/W
40	PA5	O		
41	PA6	O	DFS	"H"=96KHz
42	PA7	O		
43	ALE	O	ALE	Address Chip Enable
44	VCC	O	VCC	+5V
45	P00	I/O	AD0	Address/Data Bus0
46	P01	I/O	AD1	Address/Data Bus1
47	P02	I/O	AD2	Address/Data Bus2
48	P03	I/O	AD3	Address/Data Bus3
49	P04	I/O	AD4	Address/Data Bus4
50	P05	I/O	AD5	Address/Data Bus5
51	P06	I/O	AD6	Address/Data Bus6
52	P07	I/O	AD7	Address/Data Bus7
53	P10	I/O	AD8	Address/Data Bus8
54	P11	I/O	AD9	Address/Data Bus9
55	P12	I/O	AD10	Address/Data Bus10
56	P13	I/O	AD11	Address/Data Bus11
57	P14	I/O	AD12	Address/Data Bus12
58	P15	I/O	AD13	Address/Data Bus13
59	P16	I/O	AD14	Address/Data Bus14
60	P17	I/O	AD15	Address/Data Bus15

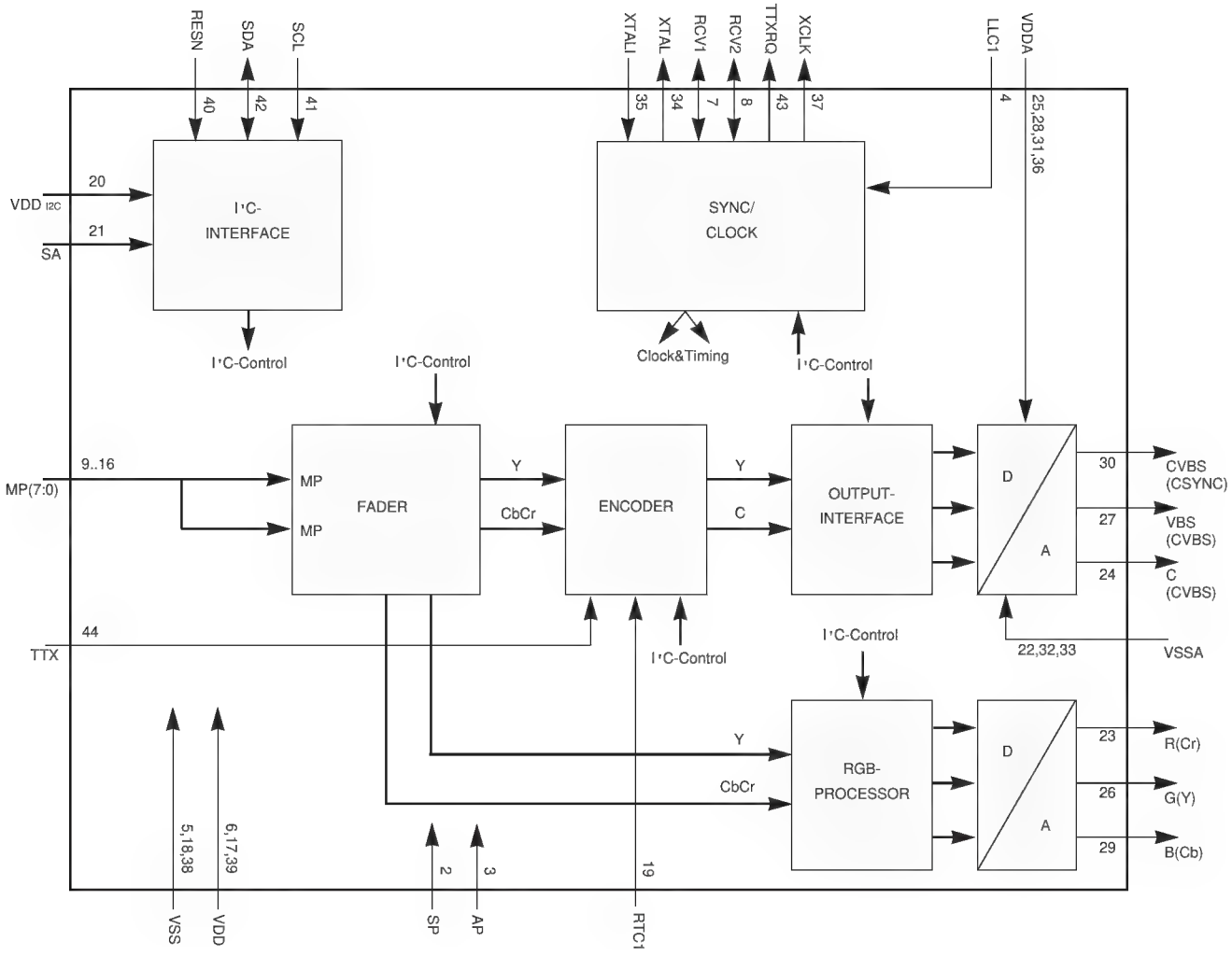
PIN ASSIGNMENT

PIN		I/O	NAME	FUNCTION
61	WDTO	I/O		
62	Vss		VSS	GND(0V)
63	Vcc		VCC	+5V
64	A16	O	A16	Address Bus 16
65	A17	O	A17	Address Bus 17
66	A18	O	A18	Address Bus 18
67	A19	O	A19	Address Bus 19
68	A20	O	A20	Address Bus 20
69	A21	O	A21	Address Bus 21
70	A22	O	A22	Address Bus 22
71	A23	O	A23	Address Bus 23
72	P30	O	/RD	Strobe for Reading External Momory
73	P31	O	/WR	Strobe for Writing Data AD0 to AD7
74	P32	O	ML0/DIF0	Audio DAC Data Latch 0 /AKM4324 Control("L"=16/24bit, "H"=20bit)
75	P33	I	WAIT	Request CPU Bus Wait
76	P34	I	/BUSRQ	Bus Request
77	P35	O	/BUSAK	Bus Acknowledge
78	P36	O	ED_K	EEPROM Trans. Clock(I2S)
79	P37	O	ED_T	EEPROM Trans. Data(I2S)
80	P40	O	/CS0	Chip Select 0
81	P41	O	/CS1	Chip Select 1
82	P42	O	/CS2	Chip Select 2
83	P60	O	DVD_SEL	DVD/CD Mode Control(DVD="Low")
84	P61	O	OPEN	Door Open Motor Control
85	P62	O	CLOSE	Door Close Motor Control
86	P63	O	S/D_SEL	Single/Dual Disc Select(Single="Low")
87	P64	O	SDA	Video Encoder Trans. Data(I²C)
88	P65	O	SCL	Video Encoder Trans. Clock(I²C)
89	P66	O	BASS	Bass Redirection Control("L"=SW On, "H"=SW Off)
90	P67	O	SLEDGS	Sled Gain Select

PIN		I/O	NAME	FUNCTION
91	Vss		VSS	GND
92	P50	I	FEI	Focus Error Input
93	P51	I		
94	P52	I	SPFG	Spindle FG Input
95	P53	I	/SECAM	SECAM="H"
96	P54	I	/PAL	PAL ="H"
97	P55	I	/NTSC	NTSC="H"
98	P56	I	OP-SW	Door Open SW
99	P57	I	CL-SW	Door Close SW
100	VREFH	I	VREFH	Reference Voltage Input to A/DC(H_i)-

6-6 DIGITAL VIDEO ENCODER
SAA7128
VIC1

BLOCK DIAGRAM



PIN ASSIGNMENT

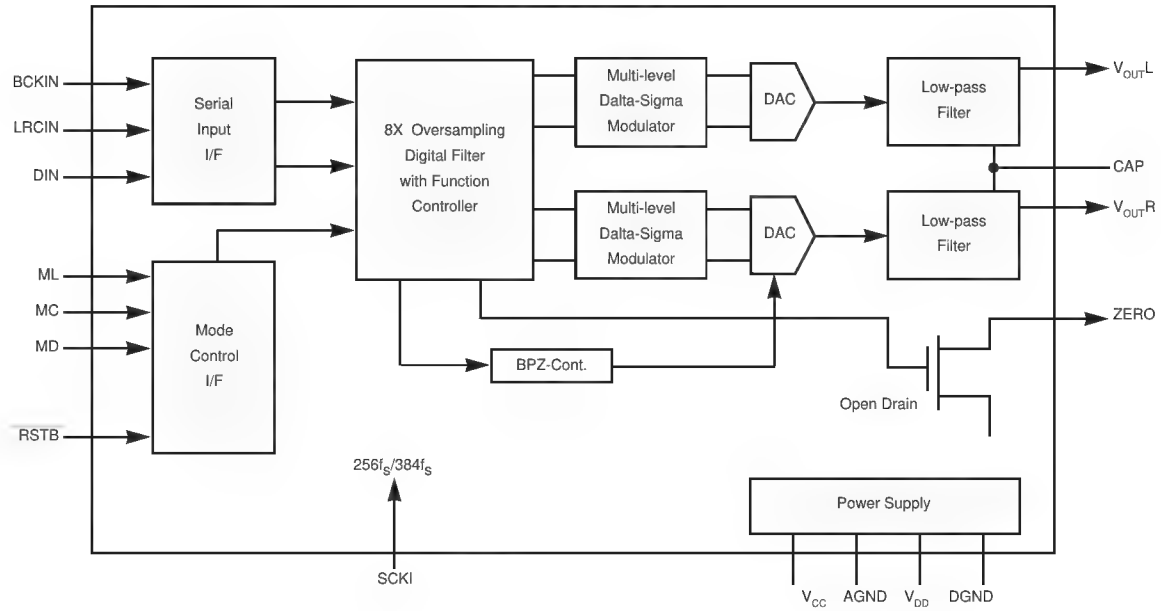
PIN	I/O	NAME	FUNCTION
1		res.	reserved pin, do not connect
2	I	SP	Test Pin;connected to digital ground for normal operation
3	I	AP	Test Pin;connected to digital ground for normal operation
4	I	LLC1	Line-Locked Clock input;this is the 27 MHz master clock
5	I	V_{SS1}	digital supply ground 1
6	I	V_{DD1}	digital supply 1
7	I/O	RCV1	Raster Contral 1 for video port. This pin receives/provides a VS/FS/FSEQ signal.
8	I/O	RCV2	Raster Contral 2 for video port. This pin provides an HS pulse of programmable length or receives an HS pulse.
9	I	MP7	Double speed 54 MHzMPEG port. It is an input for¡ *CCIR 656*¡-style multiplexed Cb, Y, Cr data. Data are sampled on the rising and falling clock edge;data sampled on the risting edge then are sent to the encoding part of the device, data sampled on the falling edge are sent to the RGB part of the device.(or vice verse, depending on programming)
10	I	MP6	
11	I	MP5	
12	I	MP4	
13	I	MP3	
14	I	MP2	
15	I	MP1	
16	I	MP0	
17	I	V_{DD2}	digital supply voltage 2
18	I	V_{SS2}	digital ground 2
19	I	RTCI	Real Time Control input. If the LLC1 clock is provided by an SAA7111 or SAA7151B, RTCI should be connected to the RTCO pin of the respective decoder to improve the signal quality.
20	I	VDD_{I2C}	Sense input for 12C bus voltage;connect to 12C bus supply
21	I	SA	Select 12C address; low selects slave address 88h, high selects slave address 8Ch.
22	I	V_{SSA1}	Analog ground 1 for Red (Cr), C(CVBS), Green(Y) outputs
23	O	R(Cr)	Analog output of Red (Cr)signal
24	O	C	Analog output of Chrominance (CVBS) signal
25	I	V_{DDA1}	Analog supply voltage 1 for R(Cr), C(CVBS) outputs
26	O	G(Y)	Analog output of Green(Y) signal
27	O	VBS	Analog output of VBS (CVBS) signal
28	I	V_{DDA2}	Analog supply voltage 2 for VBS(CVBS), Green(Y) outputs
29	O	B(Cb)	Analog output of Blue(Cb) signal
30	O	CVBS	Analog output of CVBS(CSYNC) signal
31	I	V_{DDA3}	Analog supply voltage 3 for Blue(Cb)and CVBS(CSYNC), outputs
32	I	V_{SSA2}	Analog ground 2 for VBS (CVBS), Blue(Cb), CVBS(CSYNC)outputs
33	I	V_{SSA3}	Analog ground 3 for the DAC reference ladder and the oscillator
34	O	XTAL	Crystal oscillator output
35	I	XTAL1	Crystal oscillator input; if the oscillator is not used, this pin should be connected to ground.

PIN ASSIGNMENT

PIN	I/O	NAME	FUNCTION
36	I	V_{DDA4}	Analog supply voltage 4 for the DAC reference ladder and the oscillator
37	O	XCLK	Clock output of the crystal oscillator
38	I	V_{SS3}	digital supply ground 3
39	I	V_{DD3}	digital supply 3
40	I	RESN	Reset input, active LOW. After reset is applied, all digital I/Os are in input mode; PAL-Blackburst on CVBS, VBS and C;RGB outputs set to lowest voltage. The 12C-bus receiver waits for the START condition.
41	I	SCL	12C serial clock input
42	I/O	SDA	12C serial data input/output
43	O	TTXRQ	Teletext Request output, indicating when text bits are requested
44	I	TTX	Teletext bit stream input

6-7 DIGITAL-TO-ANALOG CONVERTER
PCM 1720
AIC1(Rev.1), AIC2

BLOCK DIAGRAM

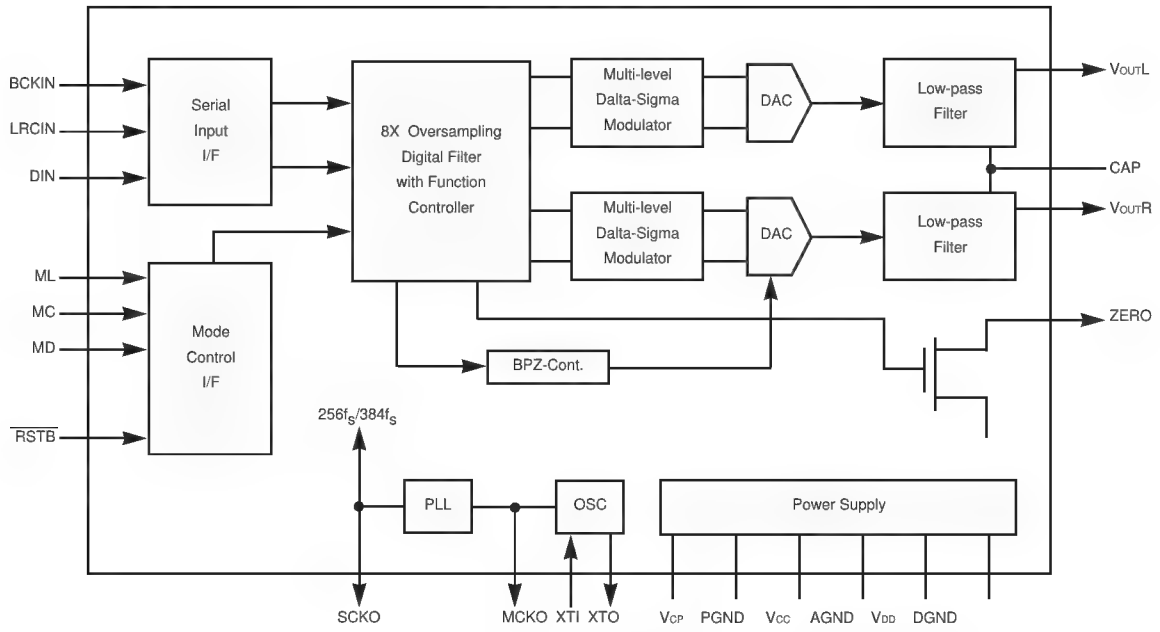


PIN ASSIGNMENT

PIN	I/O	NAME	FUNCTION
1	-	NC	No Connection.
2	IN	SCKI	System Clock input: $256f_S$ or $384f_S$.
3	OUT	TEST	Reserved for Factory Use.
4i	IN	ML	Latch Enable for Serial Control Data.
5i	IN	MC	Clock for Serial Control Data.
6i	IN	MD	Data Input for Serial Control.
7i	IN	RSTB	Reset Input. When this pin is low, the digital filters and modulators are held in reset.
8	OUT	ZERO	Zero Data Flag. This pin is low when the data is continuously zero for more than 65,535 cycles ro BCKIN.
9	OUT	$V_{OUT}R$	Right Channel Analog Output.
10	PWR	AGHD	Analog Ground.
11	PWR	V_{CC}	Analog Power Supply (+5V).
12	OUT	$V_{OUT}L$	Left Channel Analog Output.
13	-	CAP	Common Pin for Analog Output Amplifiers.
14i	IN	BCKIN	Bit Clock for Clocking in the Audio Data.
15i	IN	DIN	Serial Audio Data input.
16i	IN	LRCIN	Left/Right Word Clock. Frequency is equal to fs.
17	-	NC	No Connection.
18	-	NC	No Connection.
19	PWR	V_{DD}	Digital Power supply(+5V). Recommended connection is to the analog power supply.
20	PWR	DGND	Digital Ground. Recommended connection is to the digital ground plane.
iThese pins include internal pull-up resistors.			

6-8 DIGITAL-TO-ANALOG CONVERTER WITH PLL
PCM 1723
AIC3

BLOCK DIAGRAM

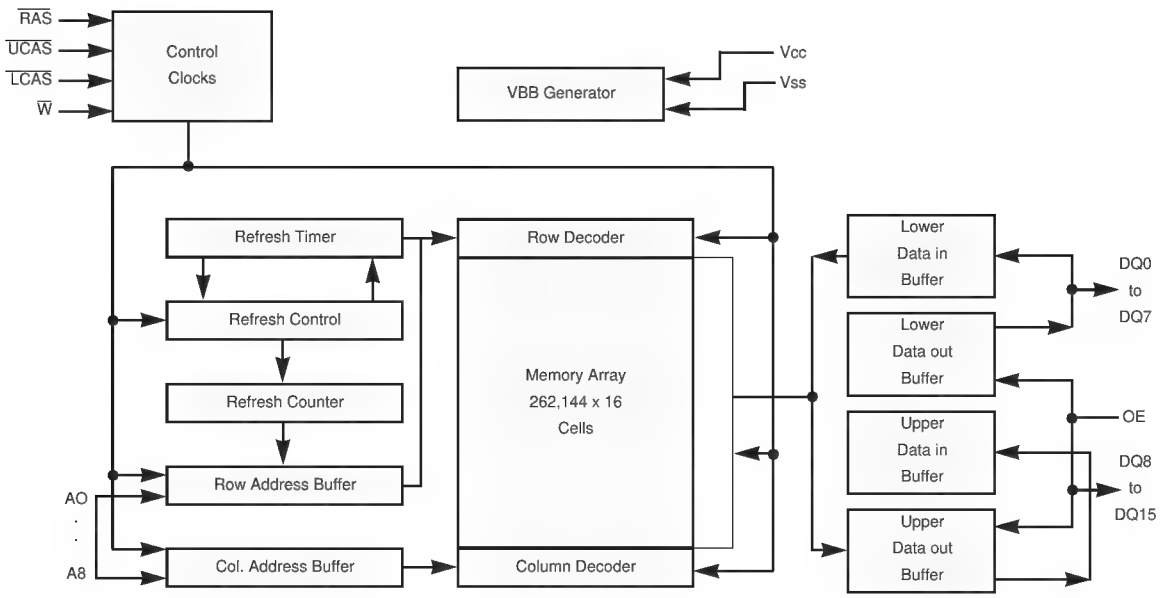


PIN ASSIGNMENT

PIN	I/O	NAME	FUNCTION
1	IN	XTI	Master Clock Input.
2	OUT	SCKO	System Clock Out. This output is $256f_S$ or $384f_S$. system clock generated by the internal PLL.
3	PWR	V_{CP}	PLL Power Supply (+5V).
4	N/A	NC	No Connection.
5	OUT	MCKO	Buffered clock output of crystal oscillator.
6	IN	ML	Latch for serial control data.
7	IN	MC	Clock for serial control data.
8	IN	MD	Data for serial control.
9	IN	RSTB	Reset Input. When this pin is low, the digital filters and modulators are held in reset.
10	OUT	ZERO	Zero Data Flag. This pin is low when the input data is continuously zero for more than 65,535 cycles ro BCKIN.
11	OUT	V_{OUT}B	Right Channel Analog Output.
12	GND	AGND	Analog Ground.
13	PWR	V_{CC}	Analog Power Supply (+5V).
14	OUT	V_{OUT}L	Left Channel Analog Output.
15		CAP	Common Pin for analog output amplifiers.
16	IN	BCKIN	Bit Cclock for clocking in the audio data.
17	IN	DIN	Serial audio data input.
18	IN	LRCIN	Left/Right Word Clock. Frequency is equal to f_S.
19	N/A	NC	No Connection.
20	N/A	RES	Reserved for factory use, do not connect.
21	PWR	V_{DD}	Analog Power Supply (+5V).
22	GND	DGND	Digital Ground.
23	GND	PGND	PLL Ground.
24	Out	XTO	Crystal oscillator output.
Note: (1) Schmitt triger input with internal pull-up resistors. (2) Schmitt triger input.			

6-9 CMOS DRAM
KM416C254DJ
BIC3, BIC4, BIC5, BIC6, BIC7

BLOCK DIAGRAM

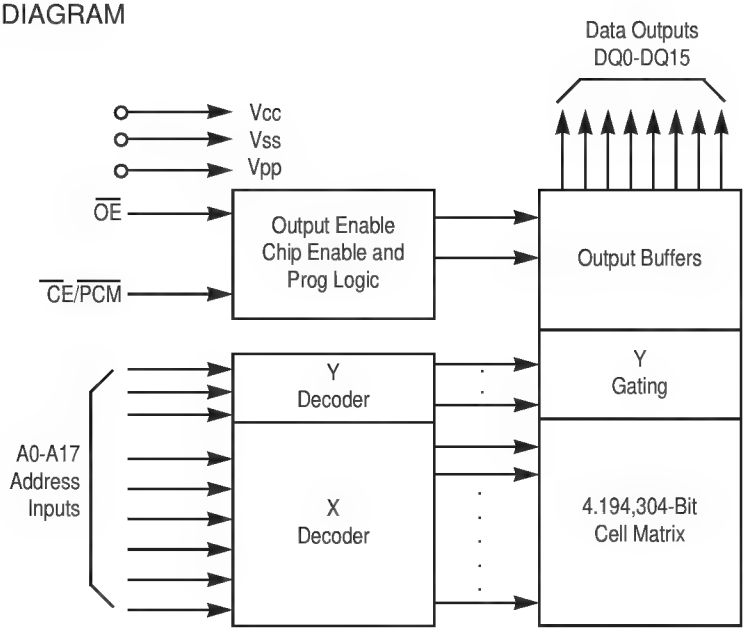


PIN ASSIGNMENT

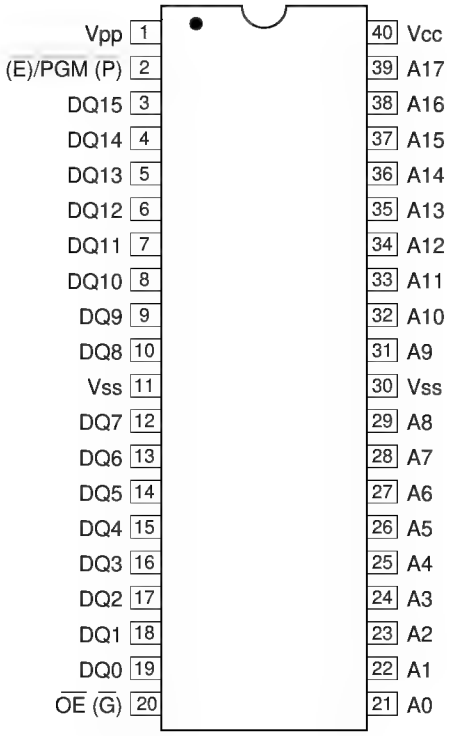
NAME	FUNCTION
A0-A8	Address Inputs
DQ0-15	Data in/Out
VSS	Ground
$\overline{RAS}$	Row Address Strobe
$\overline{UCAS}$	Upper Column Address Strobe
$\overline{LCAS}$	Lower Column Address Strobe
$\overline{W}$	Read/Write Input
$\overline{OE}$	Data Output Enable
V_{CC}	Power (+5V)
	Power (+3.3V)
N.C	No Connection

6-10 EPROM
AM27C4096
BIC2

BLOCK DIAGRAM



TOP VIEW

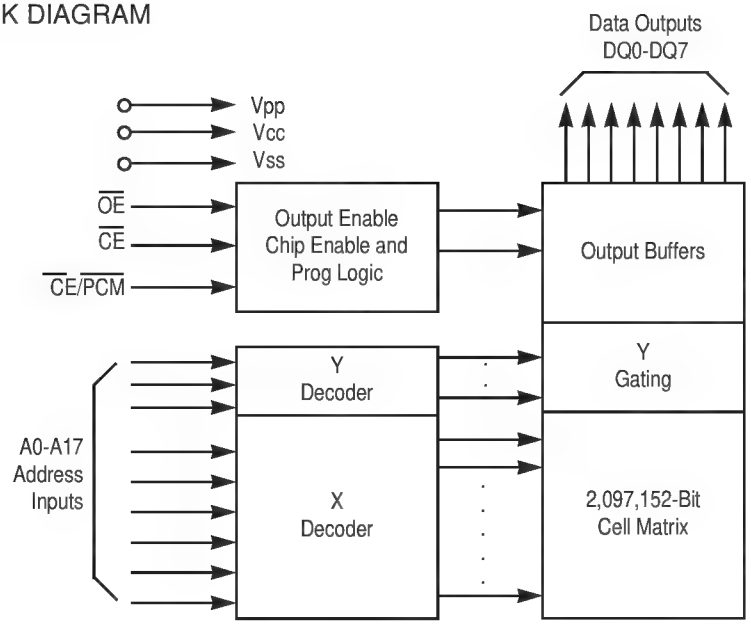


PIN ASSIGNMENT

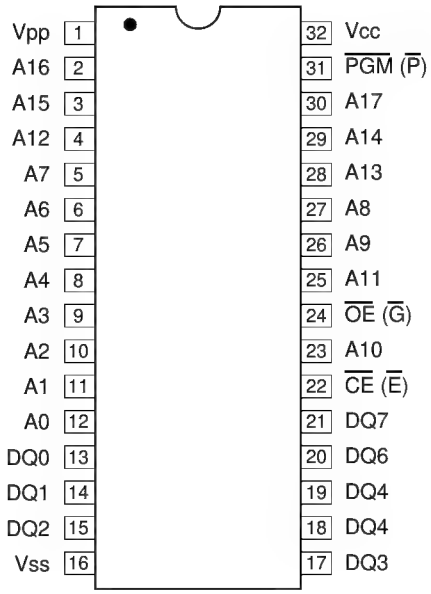
NAME	FUNCTION
A0-A17	Address Inputs
CE (E)/PGM (P)	Chip Enable Input
DQ0-DQ15	Data External Connection
DU	No External Connection
NC	No internal Connection
OE (G)	Output Enable Input
Vcc	Vcc Syply Voltage
Vpp	Program Voltage Input
Vss	Ground

6-11 2Megabit(262, 144 x 8-bit)CMOS EPROM
Am27C020
MIC2

BLOCK DIAGRAM



TOP VIEW



PIN ASSIGNMENT

NAME	FUNCTION
A0-A17	Address Inputs
$\overline{CE}$ ($\overline{E}$)	Chip Enable Input
DQ0-DQ7	Data Input/Outputs
$\overline{OE}$ ($\overline{G}$)	Output Enable Input
$\overline{PGM}$ ($\overline{P}$)	Program Enable Input
Vcc	Vcc Syply Voltage
Vpp	Program Voltage Input
Vss	Ground

6-12 FRONT MOCOM
LC 86P6232
FIC1

PIN ASSIGNMENT

PIN		I/O	NAME	FUNCTION
1	P52	O		
2	PWM1	O		
3	P20	O		
4	P21	O		
5	P22	O		
6	P23	O		
7	P24	O		
8	P25	O		
9	P26	O		
10	P27	O	MUTE0	Audio Mute 0
11		O	TEST1	TEST PORT
12		I	RESET	MICOM RESET
13		I	XT1	TIMER CLOCK
14		O	XT2	
15			VSS	
16		I	CF1	MICOM CLOCK (12MHZ)
17		O	CF2	
18		I	VDD	POWER (+5V)
19	P80	I		Not Use
20	P81	O		
21	P82	O		
22	P83	O		
23	P84	I		
24	P85	O		
25	P86	I		
26	P87	I		
27	P70	I	RRQ	FRONT MICOM <-- MAIN MICOM RECEIVE REQUEST
28	P71	I	INT1	Not Use
29	P72	I	INT2	Not Use
30	P73	I	INT3	REMOCON RECEIVE INTTERUPT

PIN		I/O	NAME	FUNCTION
31	S0	O		
32	S1	O		
33	S2	O		
34	S3	O		
35	S4	O	GRID1	FLT DISPLAY GRID 1
36	S5	O	GRID2	FLT DISPLAY GRID 2
37	S6	O	GRID3	FLT DISPLAY GRID 3
38	S7	O	GRID4	FLT DISPLAY GRID 3
39	S8	O	GRID5	FLT DISPLAY GRID 3
40	S9	O	GRID6	FLT DISPLAY GRID 3
41	S10	O	GRID7	FLT DISPLAY GRID 3
42	S11	O	GRID8	FLT DISPLAY GRID 3
43	S12	O	GRID9	FLT DISPLAY GRID 3
44	S13	O	GRID10	FLT DISPLAY GRID 3
45	S14	O	GRID11	FLT DISPLAY GRID 3
46	S15	O	SEGO	FLT DISPLAY SEGMENT 0
47		I	VDDVPP	+5V
48		I	VPP	-33V
49	S16	O	SEG1	FLT DISPLAY SEGMENT 1
50	S17	O	SEG2	FLT DISPLAY SEGMENT 2
51	S18	O	SEG3	FLT DISPLAY SEGMENT 3
52	S19	O	SEG4	FLT DISPLAY SEGMENT 4
53	S20	O	SEG5	FLT DISPLAY SEGMENT 5
54	S21	O	SEG6	FLT DISPLAY SEGMENT 6
55	S22	O	SEG7	FLT DISPLAY SEGMENT 7
56	S23	O	SEG8	FLT DISPLAY SEGMENT 8
57	S24	O	SEG9	FLT DISPLAY SEGMENT 9
58	S25	O	SEG10	FLT DISPLAY SEGMENT 10
59	S26	O	SEG11	FLT DISPLAY SEGMENT 11
60	S27	O	SEG12	FLT DISPLAY SEGMENT 12

PIN ASSIGNMENT

PIN		I/O	NAME	FUNCTION
61	S28	O	SEG13	FLT DISPLAY SEGMENT 13
62	S29	O	SEG14	FLT DISPLAY SEGMENT 14
63	S30	O	SEG15	FLT DISPLAY SEGMENT 15
64	S31	O	SEG16	FLT DISPLAY SEGMENT 16
65	P00	I	KEYIN1	KEY INPUT 1
66	P01	I	KEYIN2	KEY INPUT 2
67	P02	I	KEYIN3	KEY INPUT 3
68	P03	I		
69	P04	O		
70	P05	O		
71	P06	O		
72	P07	O	SRQ	FRONT MICOM --> MAIN MICOM SEND REQUEST
73	P10	O	TXD	FRONT MICOM --> MAIN MICOM TRNS. DATA
74	P11	I	RXD	FRONT MICOM --> MAIN MICOM RECEIVE DATA
75	P12	O	CLOCK	FRONT MICOM --> MAIN MICOM COMM. CLOCK
76	P13	O		
77	P14	O		
78	P15	O		
79	P16	O		
80	P17	O		
81	P30	O	NOR	Function Key (Scart Jack)
82	P31	O	MUTE2	Audio Mute 2
83	P32	O		
84	P33	O		
85	P34	O		
86	P35	O	MUTE1	Audio Mute1
87	P36	O		
88	P37	O		
89			VSS	
90		O	VDD	POWER +5V

PIN		I/O	NAME	FUNCTION
91	P40	O		
92	P41	O	RST	SYSTEM RESET
93	P42	O		
94	P43	O		
95	P44	O		
96	P45	O		
97	P46	O	WIDE	Function Key (Scart Jack)
98	P47	O	POWER LED	
99	P50	O		
100	P51	O	POWER	SYSTEM POWER ON (H¡ ACTIVE)

6-13 DPD IC
TA1253F
RIC2

PIN ASSIGNMENT

PIN	NAME	FUNCTION
1	AGND	Ground
2	BIN1	Four division detector B inpt
3	N.C.	No connection
4	VREF	Reference voltage input
5	CIN1	Four division detector C input
6	N.C.	No connection
7	IREF	Current source setting current input for phase difference current conversion
8	DIN1	Four division detector D input
9	DSEL	Phase difference signal off-set compensation polarity selection input
10	PDFIL1	Phase difference current voltage time constant setting external capacitor
11	PDFIL2	Phase difference current voltage time constant setting external capacitor
12	DVCC	Power (+5V) input
13	DGND	Grond
14	TEOUT	Tracking error signal ouput
15	DEFECT	Mute control input
16	TEST2	For test
17	BDDC	BD channel HPF time constant setting external capacitor
18	TEST1	For test
19	ACDC	AC channel HPF time constant Setting external capacitor
20	BACTL	Tracking error balance control input
21	DPCTL	Phase difference signal off-set compensation control input
22	N.C.	No Connection
23	AIN1	Four division detector A input
24	AVCC	Power (+5V) input

3. Product Specification

General

Power Requirements		AC 120V/60Hz
Power Consumption		18W
Weight	DVD-907	4.1Kg
	DVD-927	4.4Kg
Set Size(WDH : mm)	DVD-907	420 X 333 X 80
	DVD-927	420 X 333 X 108
Operating Temperature Range		+5¡ ~ +35¡
Operating Humidity Range		10% ~ 75%

Disc Played

DVD(Digital Versatile Disc)	Reading Speed	3.49m/sec
	Aprox. Play Time (Single Sided, Single Layer Disc)	135minutes
CD(Compact Disc):12cm	Reading Speed	1.2~1.4m/sec
	Maximum Play Time	74minutes
CD(Compact Disc):8cm	Reading Speed	1.2~1.4m/sec
	Maximum Play Time	20minutes
Video-CD	Reading Speed	1.2~1.4m/sec
	Maximum Play Time	74minutes (Video+Audio)

Video Output Level (75$ load)

RCA Jack	Comoposite	1.0Vp-p
	Y	1.0Vp-p
	Pr	0.70Vp-p
	Pb	0.70Vp-p
Scart Jack	R(Red)	0.714Vp-p
	G(Green)	0.714Vp-p
	B(Blue)	0.714Vp-p
	Composite	1.0Vp-p
S-Video	Luminance Signal	1Vp-p
	Color Signal	0.286Vp-p

Video outputs

	Europe	North America Middle America Korea	South America	China Russia East-Soth Asia
CVBS	2	2	2	2
Y/C	1	1	1	1
Y, Pr, Pb		1set	1set	1set
R,G,B(SCART)	1set			
TV mode Selection	NTSC PAL SECAM	NTSC	NTSC PAL-M PAL-N	NTSC PAL SECAM

Audio Output Level

Analog	Stereo (RCA Jack)	2Vrms(1KHz)(50K$)
	Stereo (Scart Jack)	2Vrms(1KHz) (50K$)
	Dolby Digital 5.1 ch. Analog Output	2Vrms(1KHz) (50K$)
Digital	Coaxial	0.5Vp-p (75$)
	Optical	

Audio Characteristics

Frequency Response	48KHz Sampling	4Hz ~ 22KHz
	96KHz Sampling	4Hz ~ 44KHz
S/N Ratio		100dB
Dynamic Range		96dB
THD(Total Harmonic Distortion)		0.005%
Wow and Flutter		Under the limited value of measuring

4. Operating Instructions

4-1 Remote Control

4-1-1 Basic Operations

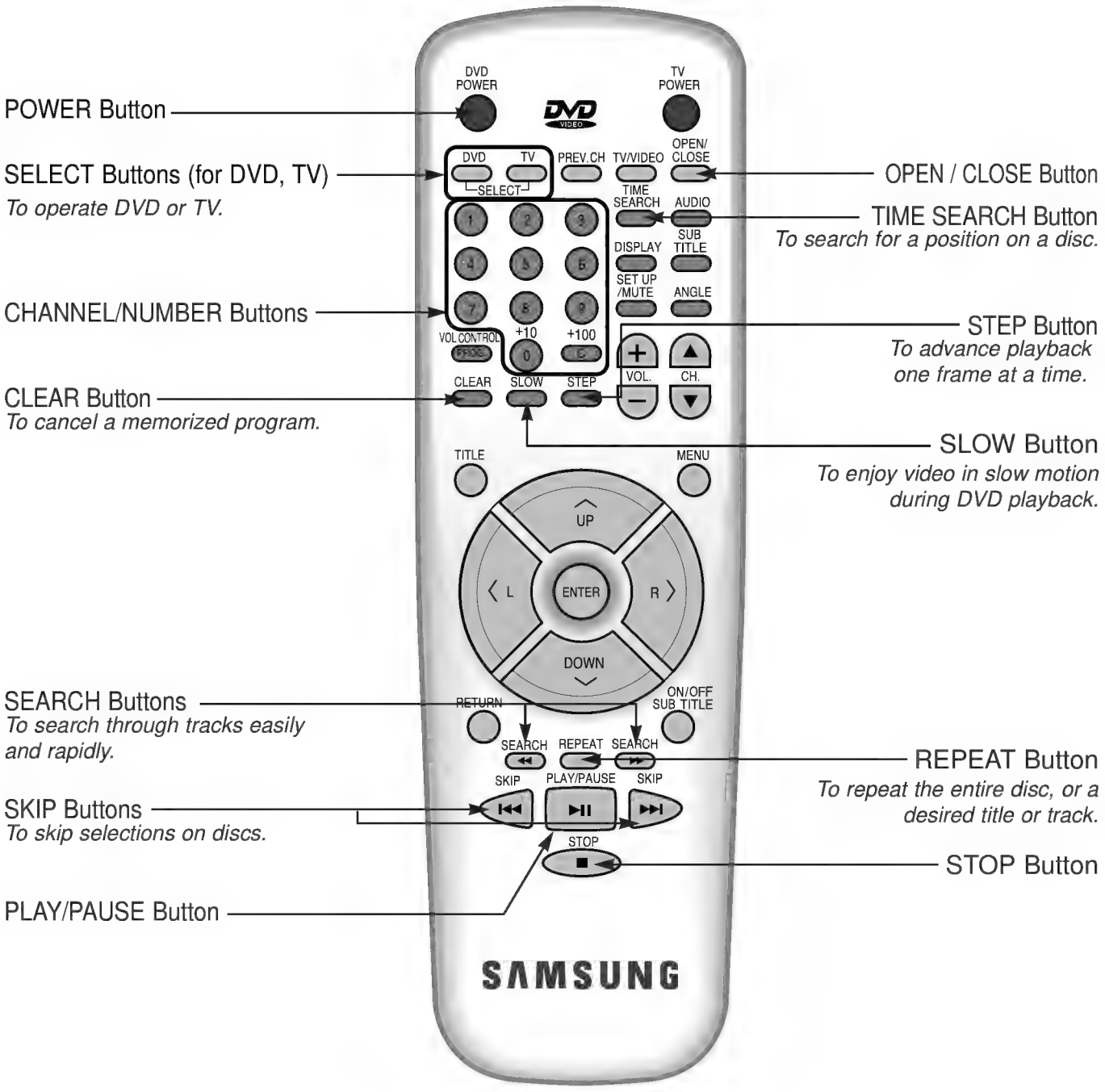
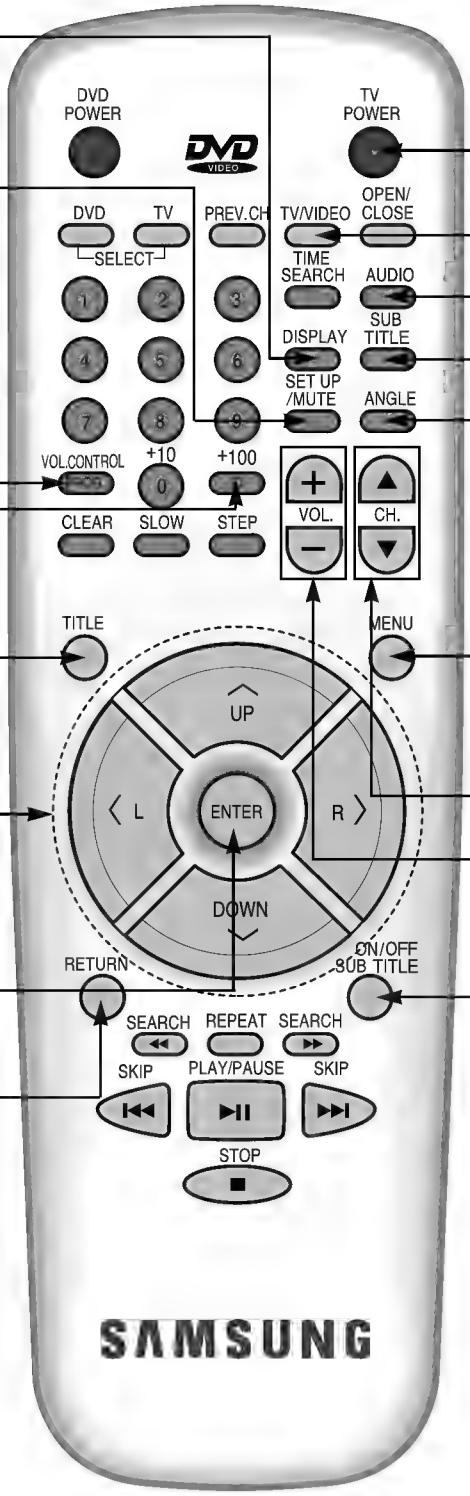


fig 4-1

4-1-2 Button for DVD/TV



DISPLAY Button
To see the current DISC mode.

SET UP/MUTE Selector
To bring up the setup menu or to mute the TV sound temporarily.

VOL.CONTROL Button
To control the sound volume of analog AC-3 output.

CHAPTER Button
To search chapters.

TITLE Button

DIRECTION Buttons
When using the menus, press these buttons when you want to move to desired position.

ENTER Button
To play a selected title.

RETURN Button
To return to a previous menu.

TV POWER Button

TV/VIDEO Selector
To select TV or VIDEO.

AUDIO Selector
To select Audio when playing a DVD disc.

SUBTITLE Selector
To select the sub title when playing a DVD disc.

ANGLE Selector
To change the screen angle.

MENU Button
To change audio, subtitle, angle.

CHANNEL Selector

VOLUME CONTROL Button

SUBTITLE Button
To turn subtitles on or off.

fig 4-2

4-2 Use of Menu

4-2-1 Use of Menu on the Disc

- Various Menus are listed on a DVD, and menus differ from disc to disc.
- You can see the menu screen only when a menu is contained on the disc.

4-2-2 Use of Setup Menu

1) Screen Menu Language
   You can select the menu language recorded on the disc
   If the selected menu language is not recorded on the disc, the original pre-recorded language is selected.
2) Audio Language
   If you set up the audio language in advance, you can watch movies with pre-selected audio. You don*t need to set up audio every time you watch a movie.
   If the selected audio language is not recorded on the disc, the original pre recorded audio language is selected.
3) Subtitle Language
   If you set up the subtitle language in advance, it will come up automatically every time you watch a movie.
   If the selected subtitle is not recorded on the disc, the original pre-recorded Subtitle is selected.
4) Screen Angle Mark
   This function allows you to turn the screen angle mark on or off in order to view various screen angles.
   If your DVD disc is encoded with screen angles, angle mark will be displayed when the screen angle mark is set to *ON*
5) Parental Level
   The Parental Level control allows users to set the level necessary to prevent children from viewing unsuitable movies such as those with violence, adult subject matter, etc. ... There are up to 8 parental levels on a disc and they can be used to prevent the viewing of certain movies. For Example, Level 1 is the "Kids Safe" level and is the most restrictive. Only youth oriented movies will be played back when the player is set to Level 1. Level 8 is the "Adult" level and is the least restrictive. All types of movies will play when the player is set to this level.
   The Parental Level Control function is compatible only with parental level encoded discs.
   If you forget your password, press the CLEAR button 3 times successively while in the *ENTER PASSWORD*
   1111 is the original password that has been encrypted in the player by the manufacturer.
6) Screen Ratios
   As DVD supplies the screen with a 16:9 ratio, you can decide which type of screen you want to watch.
   The Screen Ratio settings depend on What is encoded on the disc.
7) Audio Output
   You can configure the digital audio output jack to deliver Dolby Digital (AC-3) Data to any AC-3 decoding amplifier by using the setup menu. If you are not using an AC-3 decoding amplifier, you should configure the audio output as PCM in setup menu.
   If you*ve configured the audio output as PCM, the audio output is automatically changed to AC-3 when you set either CENTER or SURROUND in SURROUND SOUND as YES.
   If you*ve configured the audio output as PCM, both CENTER and SURROUND in surround sound are automatically changed to NO.
8) Surround Sound
   You can configure analog audio output as surround sound or stereo sound using the setup menu. If you*ve selected surround sound output, you should specify the status of your speaker system to hear surround sound suitable for your speaker system.
   If you*ve configured the digital audio out as PCM, the selection of *SURROUND SOUND* will not work.
   If you have only front left and right speakers, you should set center, surround, subwoofer to *NO*.
   If you have front left, front right and center speakers only, you should set the center to *YES*
   If you have only front left, front right, center and surround speakers, you should set the center and surround to *YES*
   If you have all speakers needed for AC-3, you should set the center, surround and subwoofer to *YES*.
   When you have configured the audio output as AC-3 and have set the CENTER of the surround sound to YES, you must have a center speaker connected to hear the dialogue.

4-3 CONNECTION

4-3-1 Basic Connection

1) Connecting to a TV

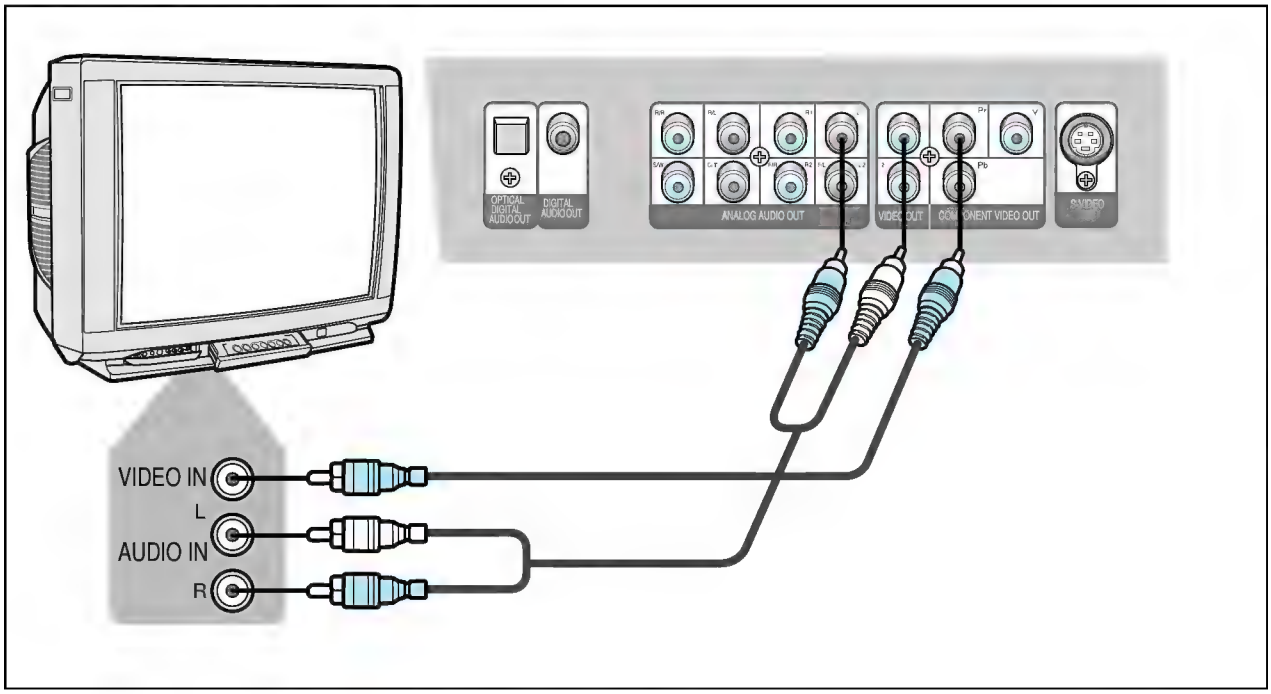


Fig.4-3

2) Connecting to an Audio system

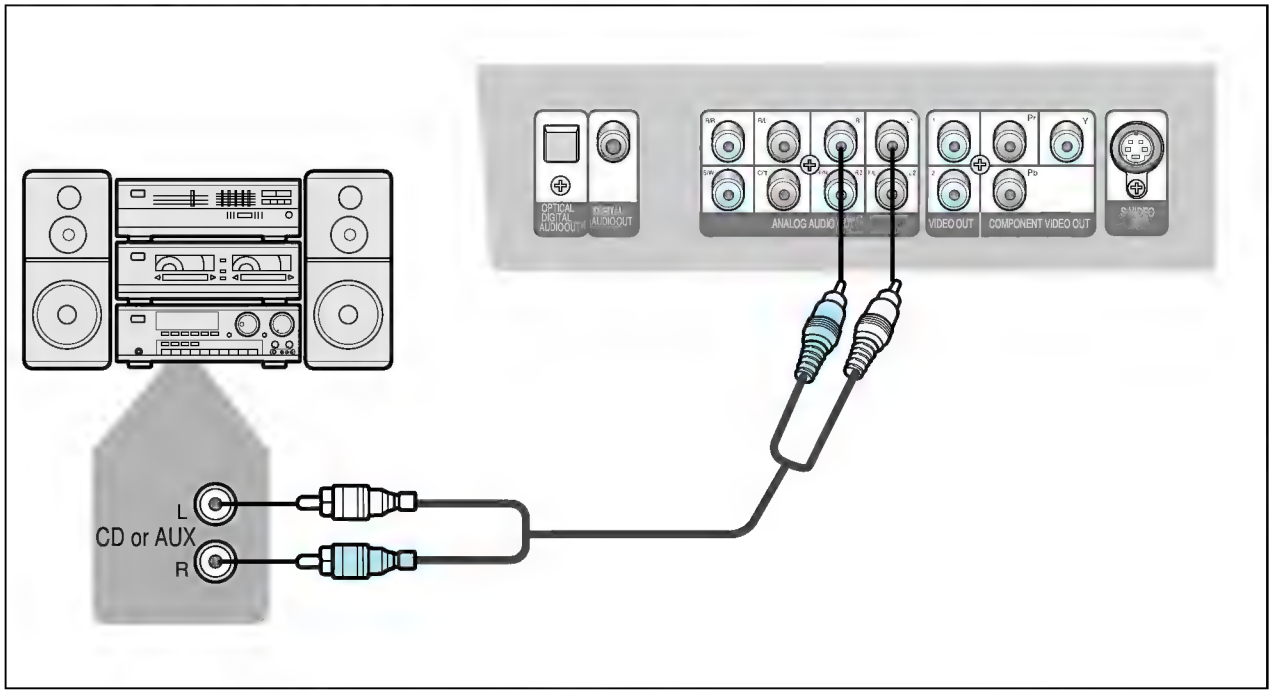


Fig. 4-4

4-3-2 Connections

1) S-VIDEO Connection

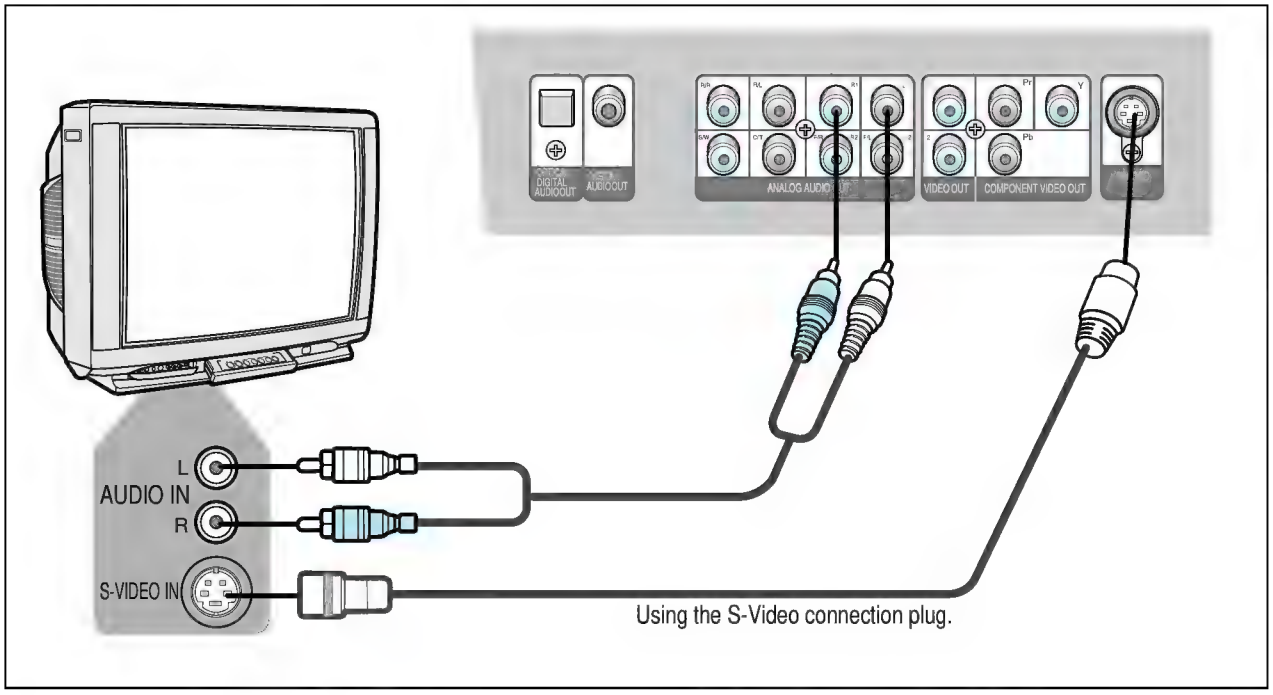


Fig. 4-5

2) AC-3 5.1 channel and Y,Pr,Pb Video connection

•Component signals(Y, Pr, Pb) are output from the Y,Pr,Pb jacks.

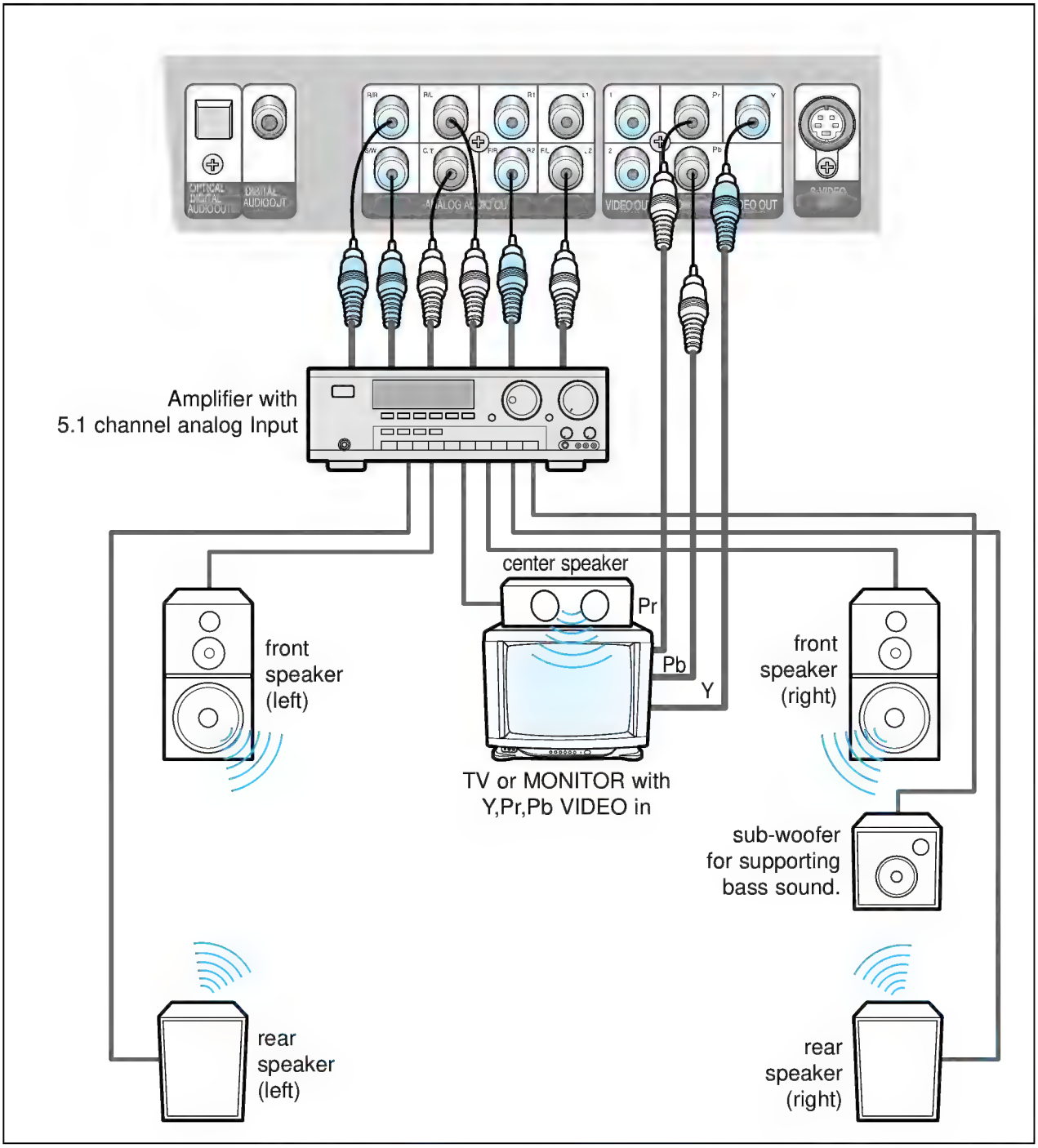


Fig. 4-6

3) AC-3 5.1 channel and S-Video connection

• AC-3 5.1 channel connection.

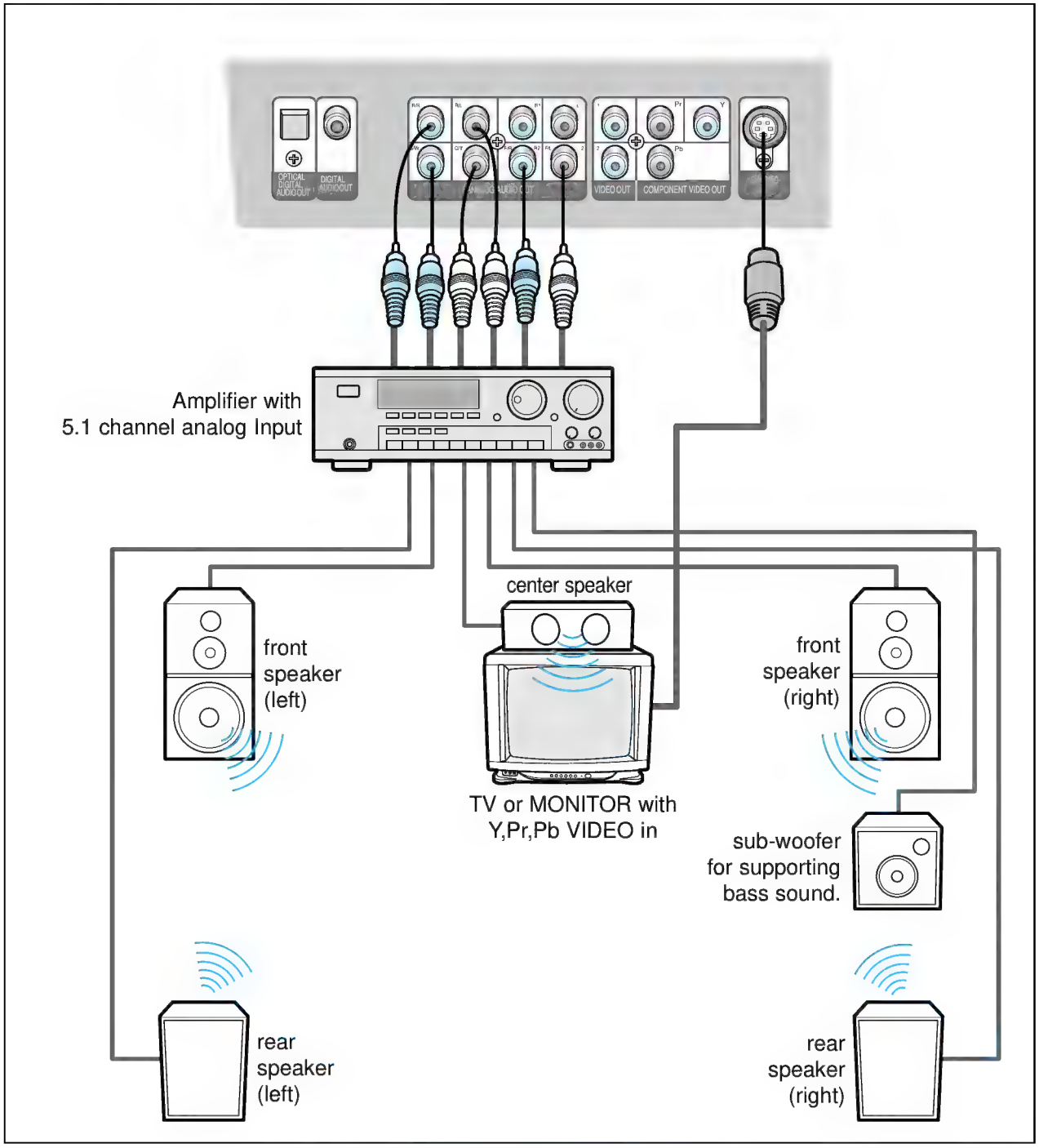


Fig. 4-7

4) Stereo amplifier and S-Video connection. (2 channel)

- Normal stereo amplifier connection, (2 channel)

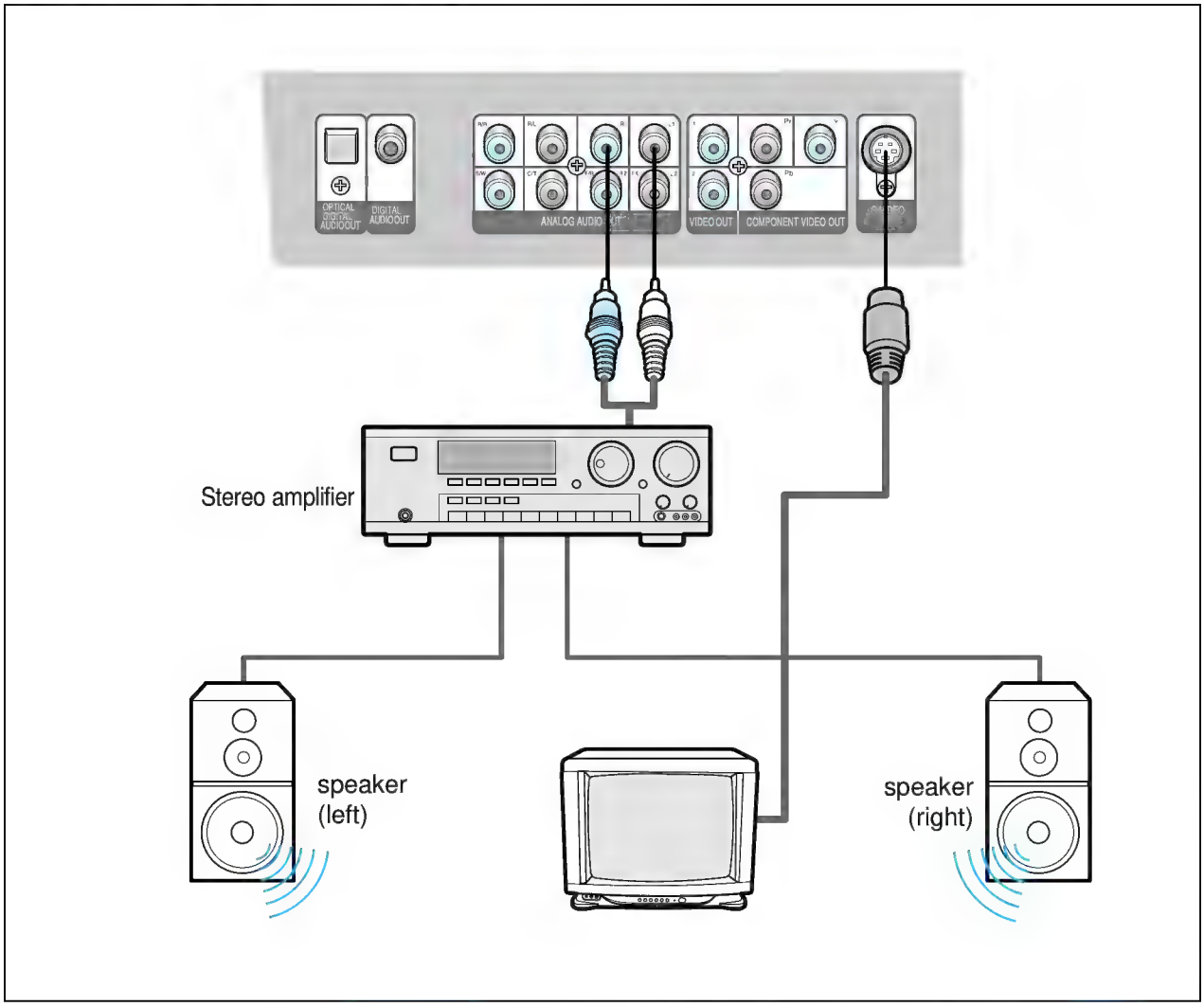


Fig. 4-8

5) Dolby Pro-Logic Connection

- Either the Optical Digital Audio Out, Digital Audio Out or Analog Audiot Out (R/L) should be connected to the Dolby Pro-Logic amplifier.
- The Optical Digital Audio Out and Digital Audio Out both output the same signal.

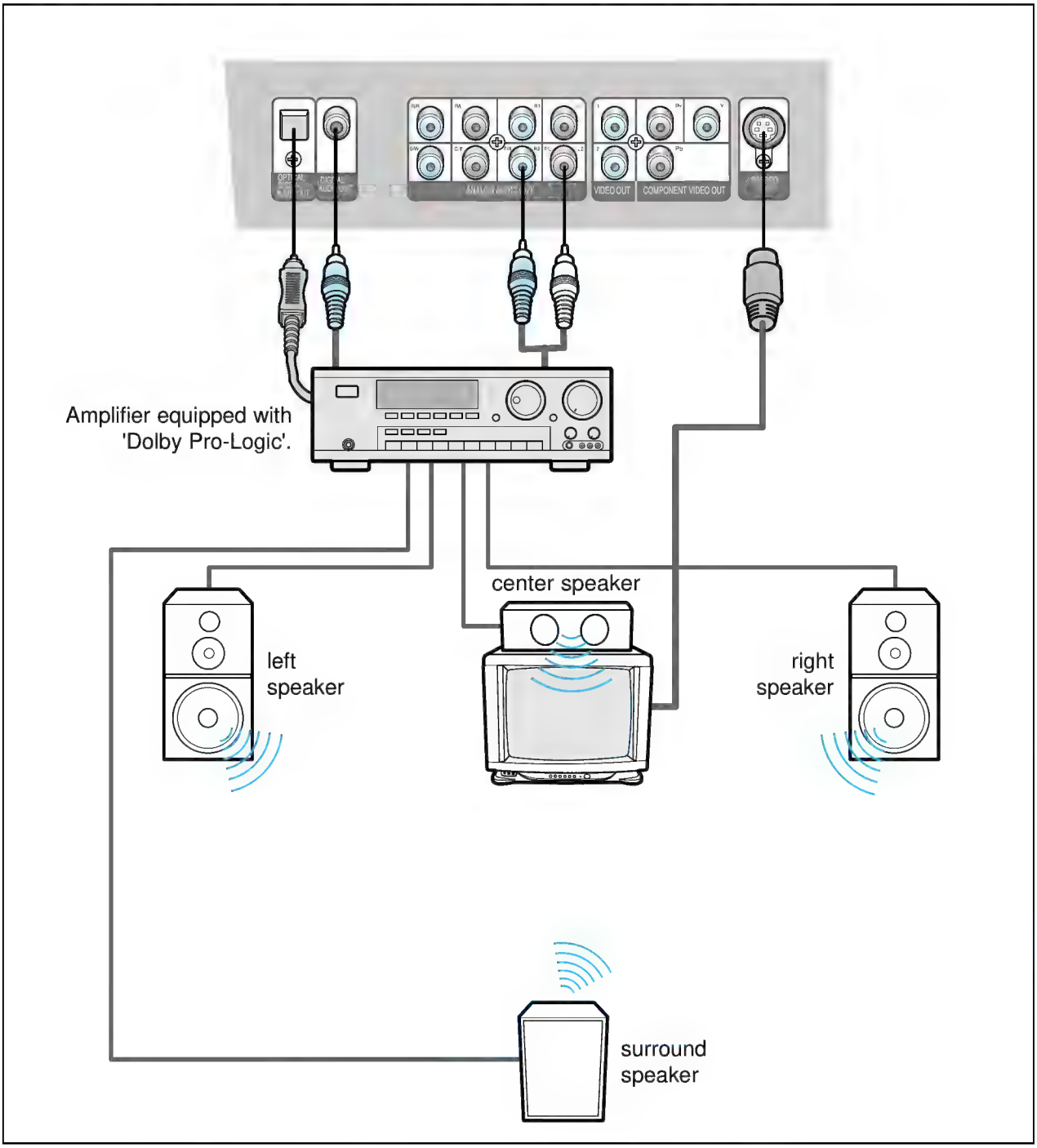


Fig. 4-9

6) AC-3 decoder amplifier digital connection

- Either the Optical Digital Audio Out or the coaxial Digital Audio Out should be connected to the AC-3 decoder amplifier.
- The Optical Digital Audio Out and Digital Audio Out both output the same signal.

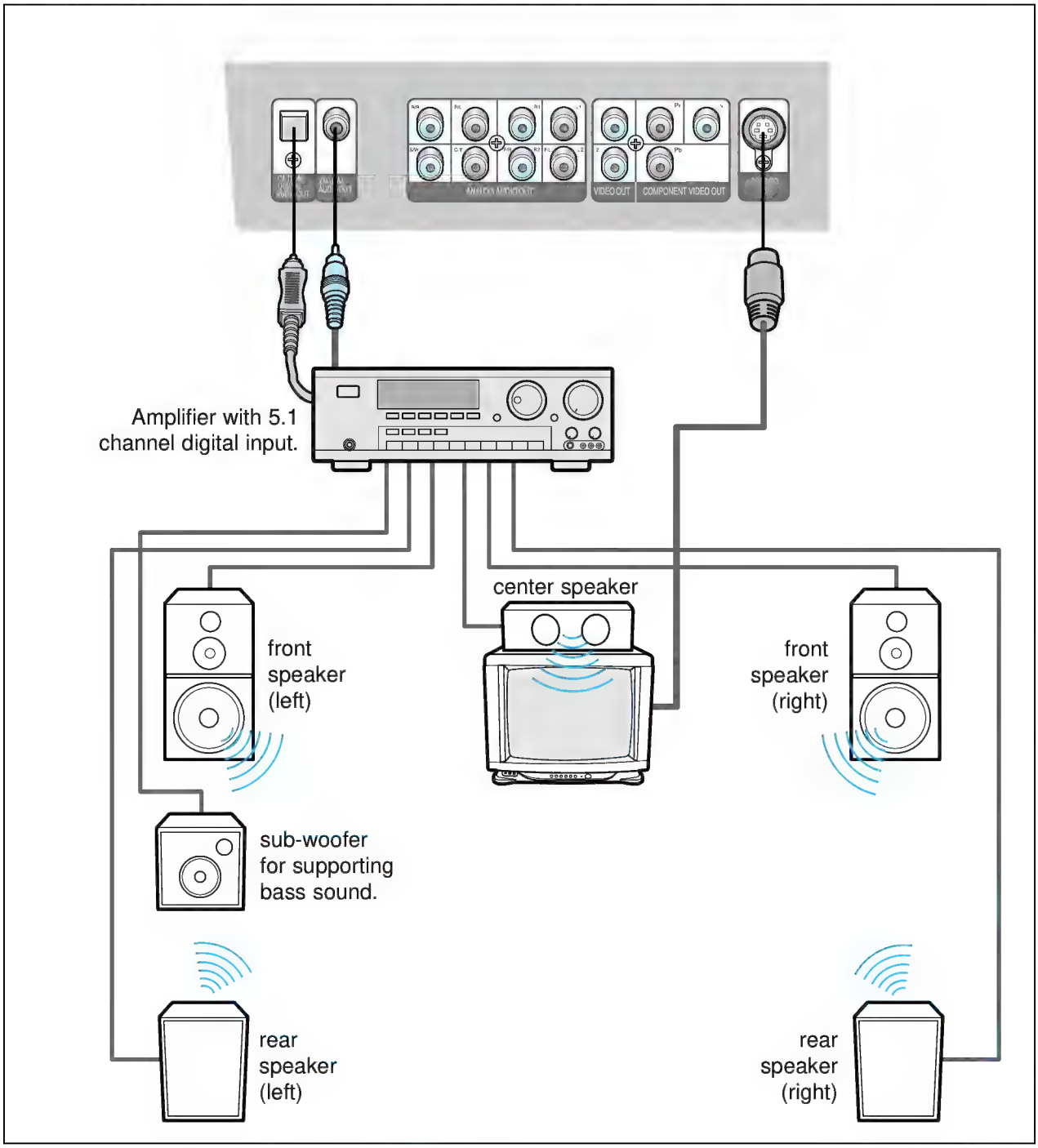


Fig. 4-10

5. Disassembly and Reassembly

5-1 DVD-907

5-1-1 Exterior and PCB Disassembly

5-1-1(a) Door-tray

1) Supply power and open Tray ❶ .
2) Disassemble the door-tray ❷ in direction of arrow.
3) Close Tray ❶ and power off.

Note : If Tray ❶ doesn't open, insert a clip ❸ into the hole (as shown in detailed drawing), and open Tray ❶ manually.

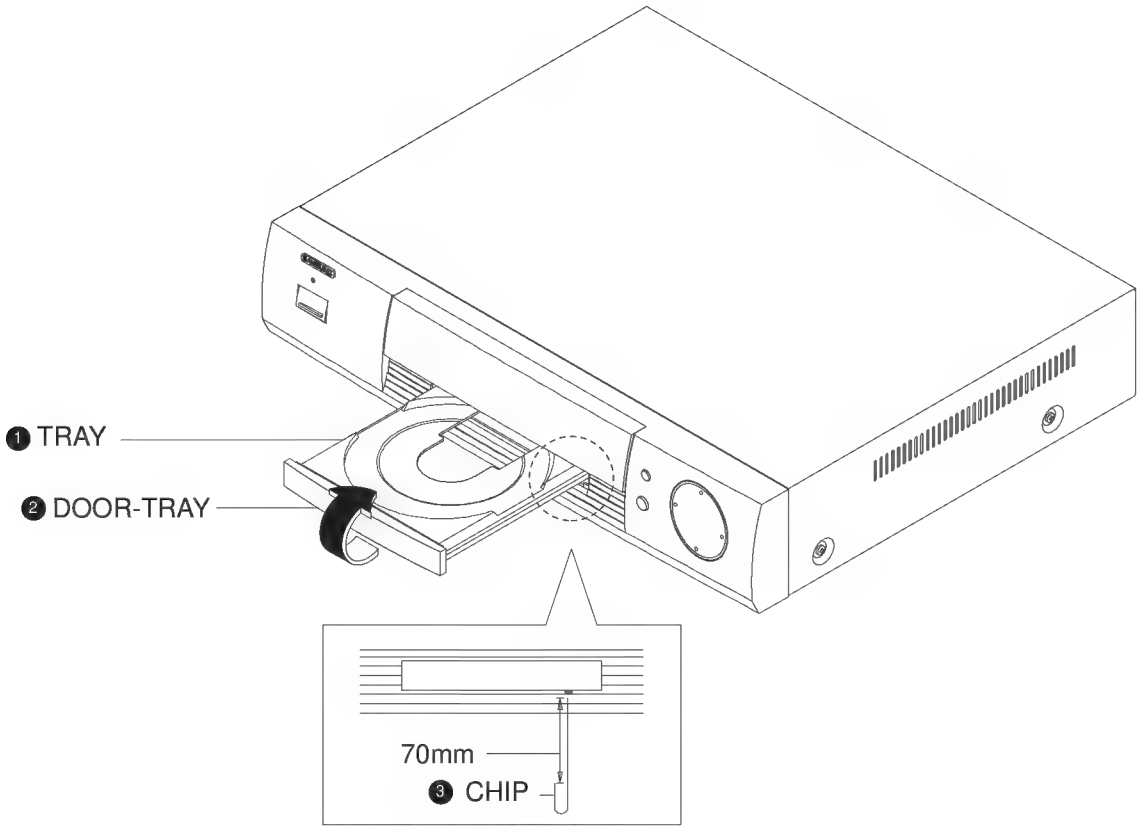


Fig. 5-1

5-1-2(b) Top cabinet

1. Remove 3 screws ❶ on the back panel.
2. Remove 4 screws ❷ , ❸ on the left and right side.
3. Lift up the top cabinet in direction of arrow.

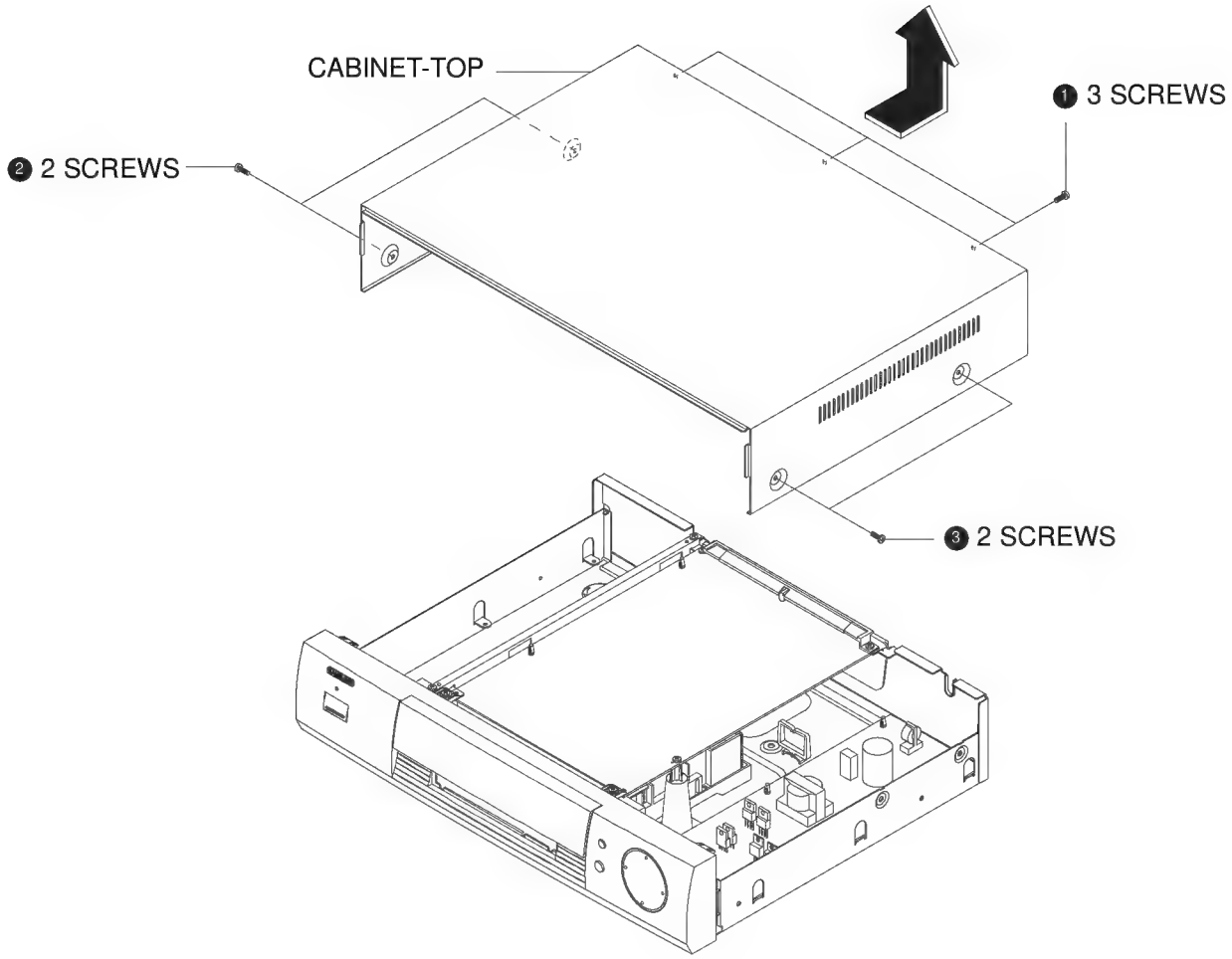


Fig. 5-2

5-1-3(c) Panel-Front, PCB Front

1. Remove 2 screws ❶ , ❷ on the left and right side of panel-front ass'y
2. Remove 2 screws ❸ on the top of cover-panel ass'y and disassemble the front.
3. Remove 2 screws ❹ from PCB-front.
4. Remove 2 hooks to fix PCB-front and disassemble PCB-front.

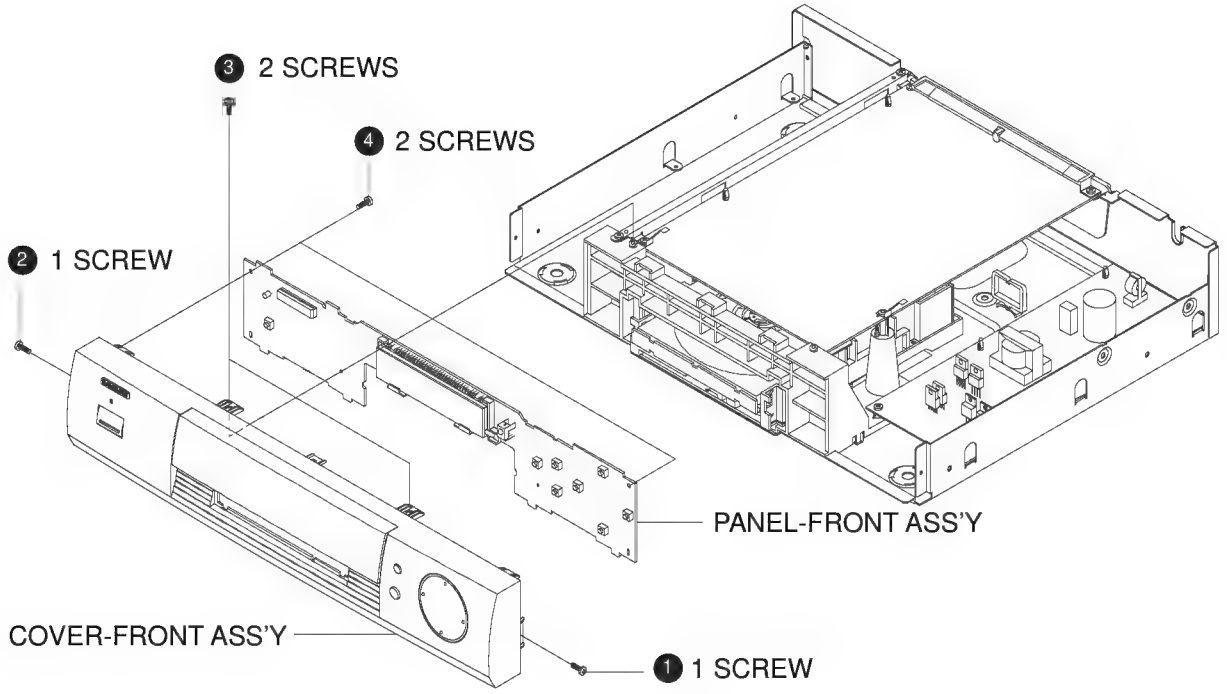


Fig. 5-3

5-1-4(d) PCB-MAIN, PCB-SMPS

1. Remove 4 screws ❶ to fix PCB-MAIN.
2. Remove 2 Holder-PCB ❷ inserted in PCB-MAIN and lift up PCB-MAIN.
3. Remove 4 screws ❸ from PCB-SMPS.
4. Remove 2 Spacer-PCB ❹ inserted in PCB-SMPS and lift up PCB-SMPS.
5. Remove 2 screws ❺ to fix BRKT-PCB ass'y.

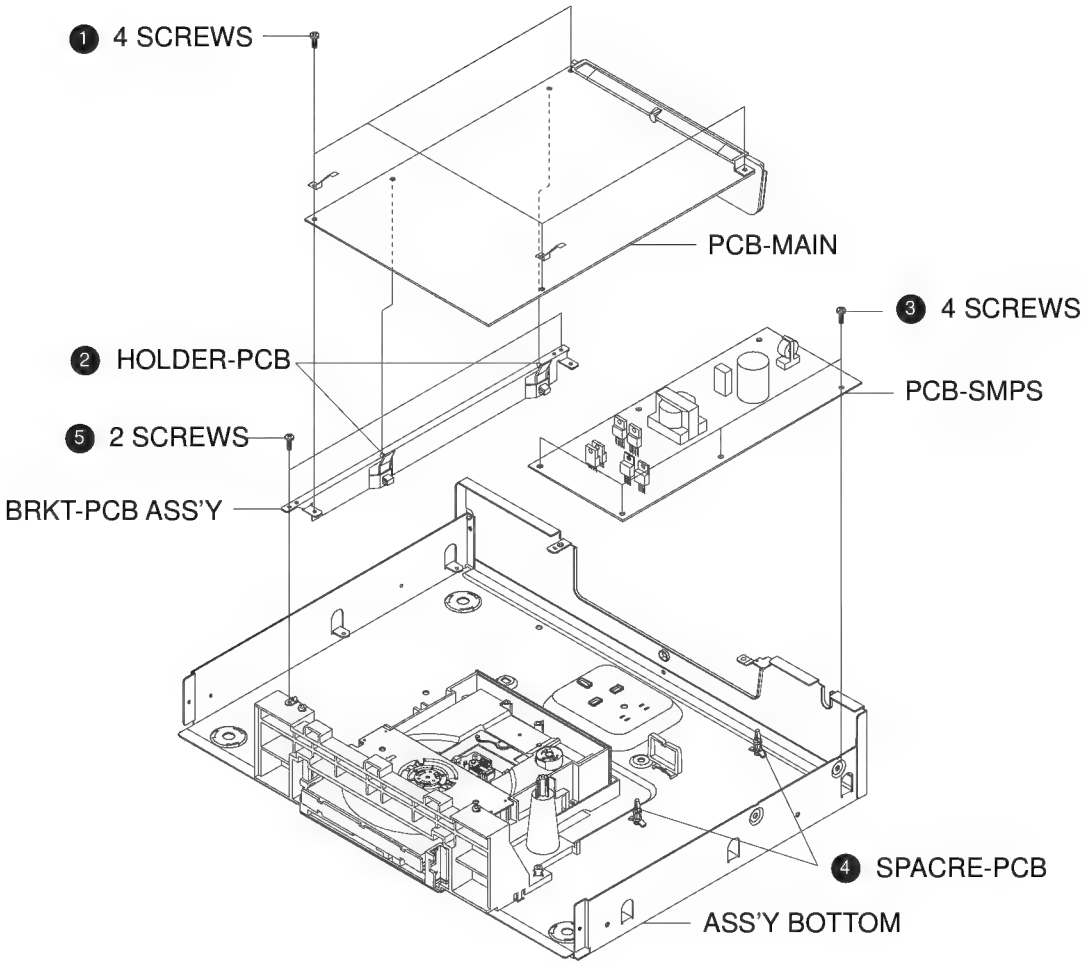


Fig. 5-4

5-1-5(e) Deck, Frame-chassis

1. Remove 4 screws ❶ from the deck and lift it up.
2. Remove 1 screws ❷ and 2hooks ❸ from the frame-chassis and lift it up.

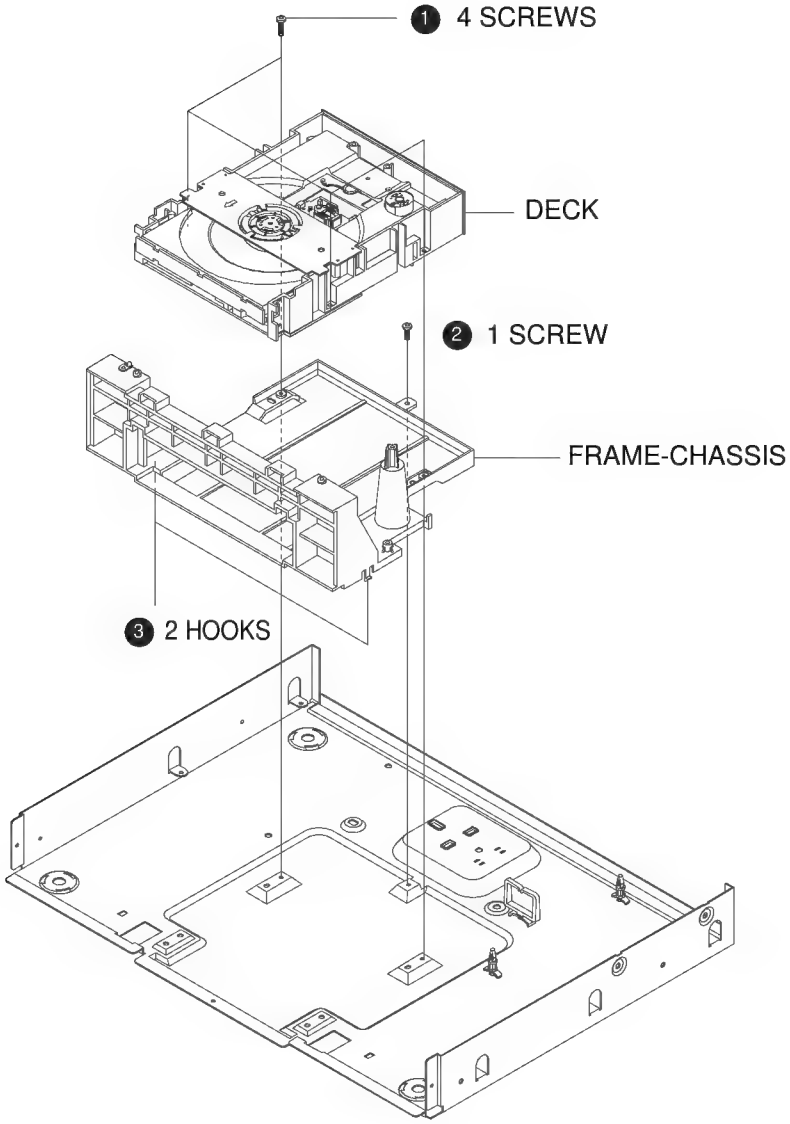


Fig. 5-5

5-1-2 PCB Locations

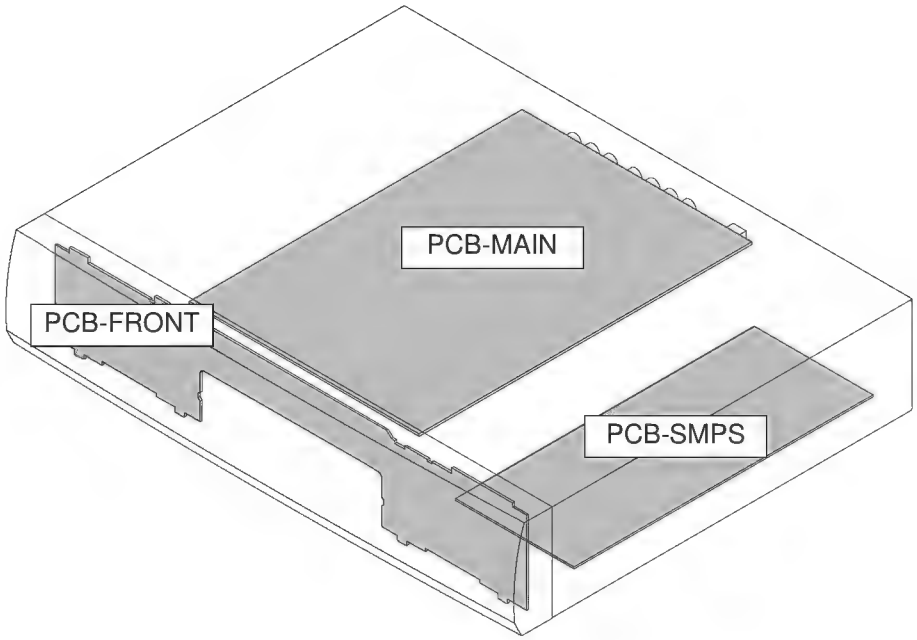


Fig. 5-6

5-1-3 Connector Diagram

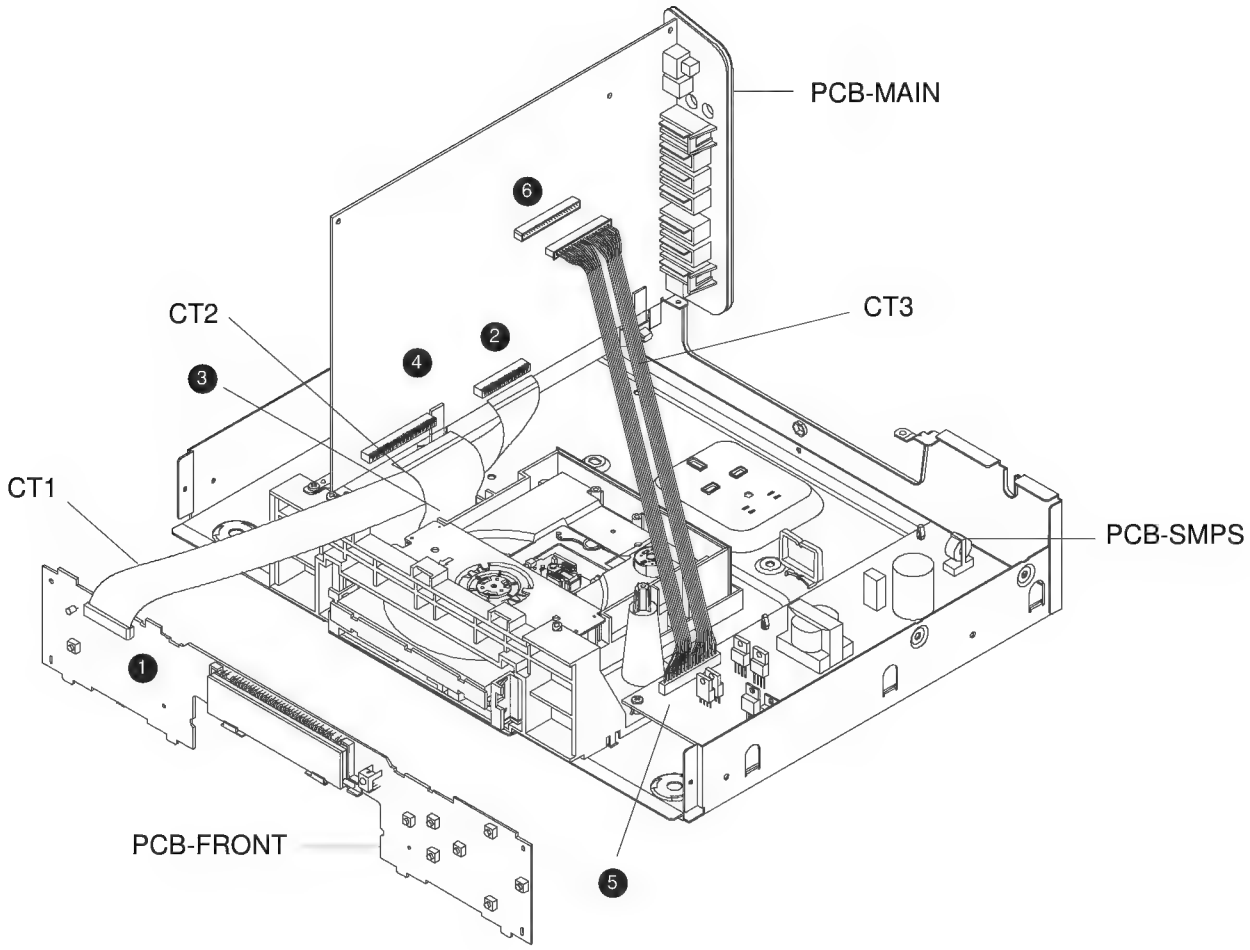


Fig. 5-7

No.	Connector wafer No.	Direction	Connector wafer No.
1	FJP1	CT1 ⟶ PCB-MAIN	DCN1
2	DCN1	PCB-FRONT	FJP1
3	CN5	CT2 ⟶ PCB-MAIN	CN1
4	CN1	DECK	CN5
5	PCN02	CT3 ⟶ PCB-MAIN	PCN1
6	PCN1	PCB-SMPS	PCN02

5-2 DVD-927

5-2-1 Exterior and PCB Disassembly

5-2-1(a) Door-tray

1) Supply power and open Tray ❶.
2) Disassemble the door-tray ❷ in direction of arrow.
3) Close Tray ❶ and power off.

Note : If Tray ❶ doesn't open, insert a clip ❸ into the hole (as shown in detailed drawing), and open Tray ❶ manually.

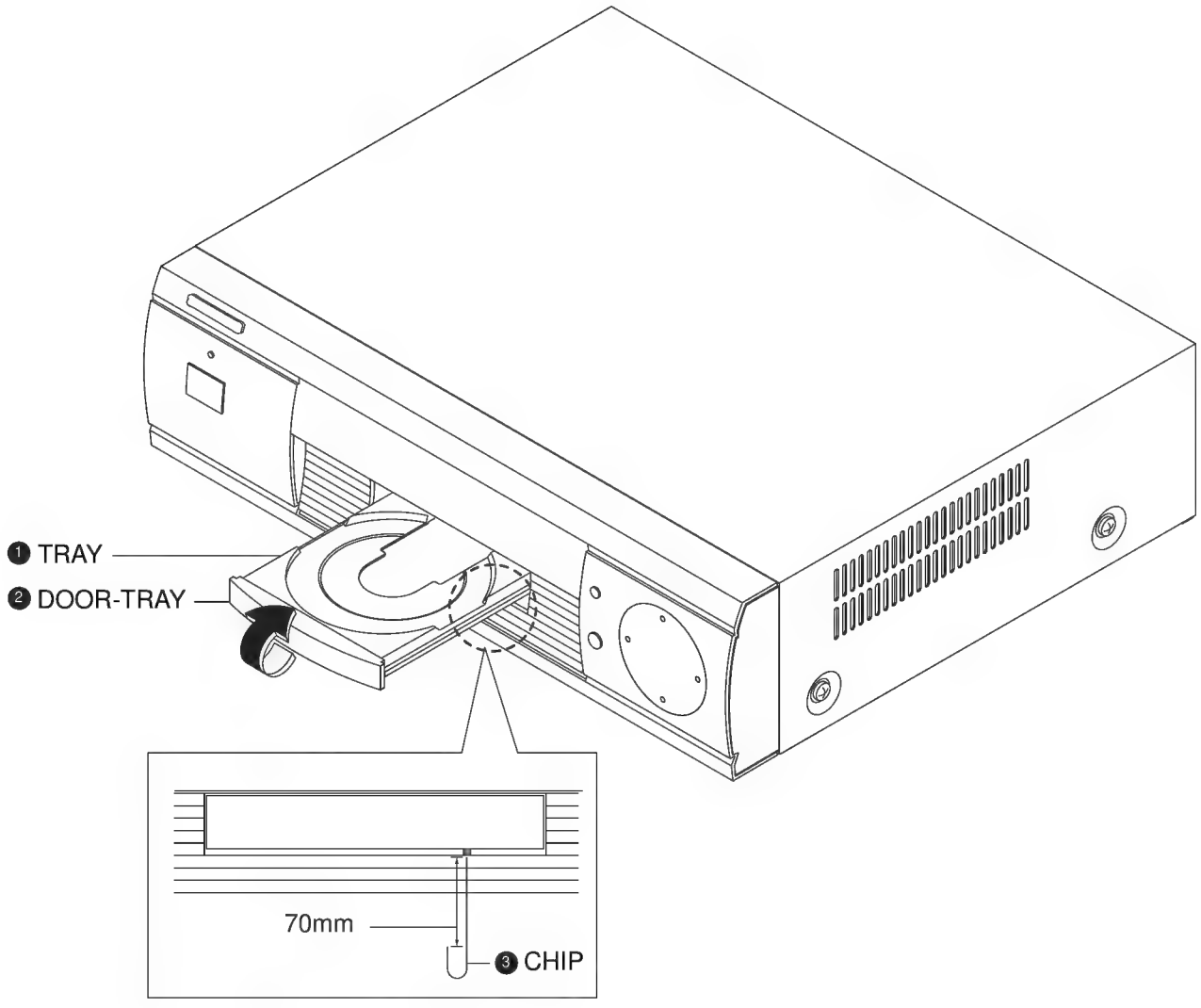


Fig. 5-8

5-2-2(b) Top cabinet

1. Remove 3 screws ❶ on the back panel.
2. Remove 4 screws ❷ , ❸ on the left and right side.
3. Lift up the top cabinet in direction of arrow.

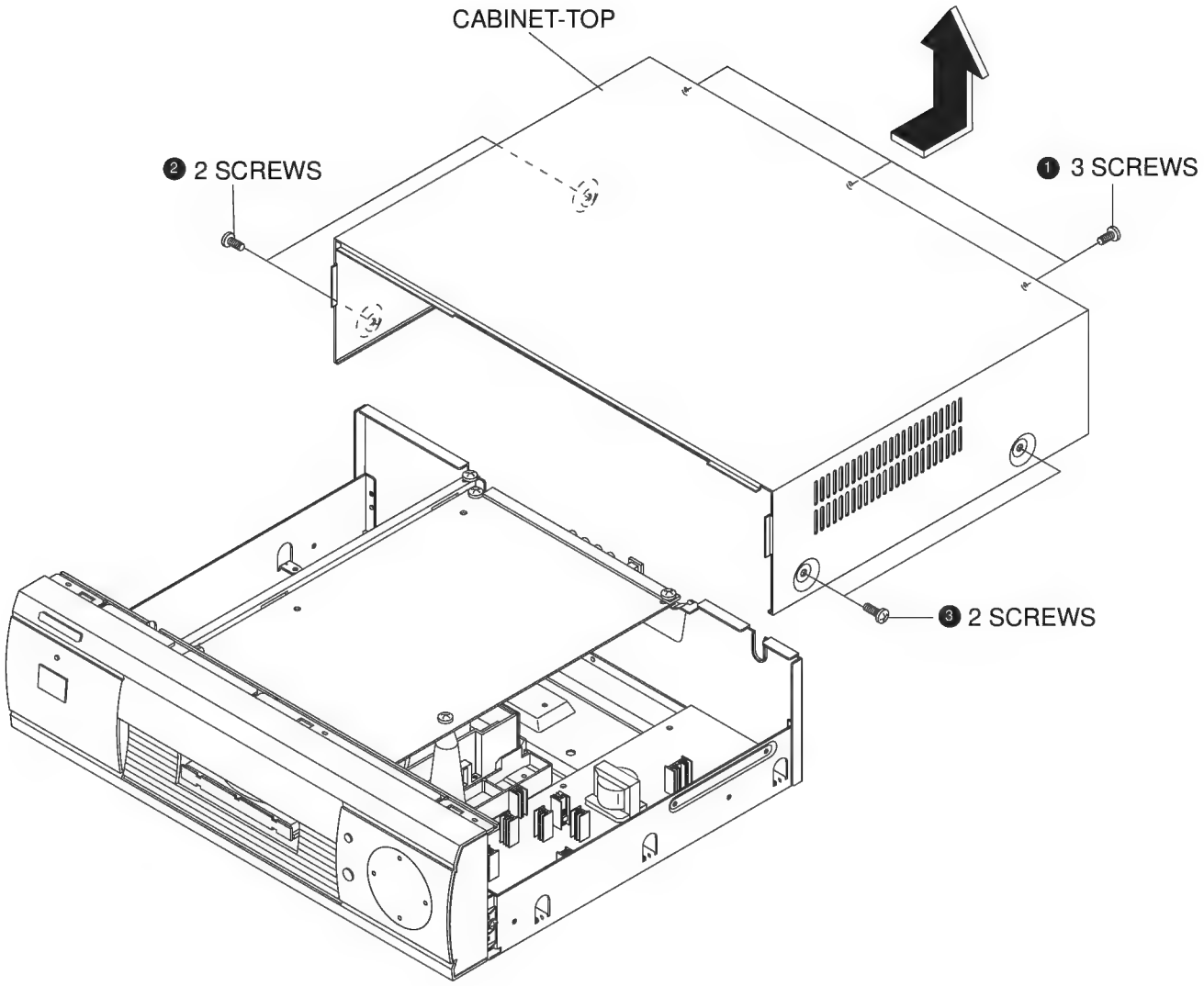


Fig. 5-9

5-2-3(c) Panel-Front, PCB-Front

1. Remove 2 screws ❶ , ❷ on the left and right side of panel-front ass'y
2. Remove 2 screws ❸ on the bottom of cover-panel ass'y and disassemble the front.
3. Remove 2 screws ❹ from PCB-front.
4. Remove 9 hooks to fix PCB-front and disassemble PCB-front.
5. Remove 2 screws ❺ on the top of cover-panel ass'y
6. Remove 4 top hooks ❻ and 5 bottom hooks ❼ and disassemble the cover-panel ass'y.

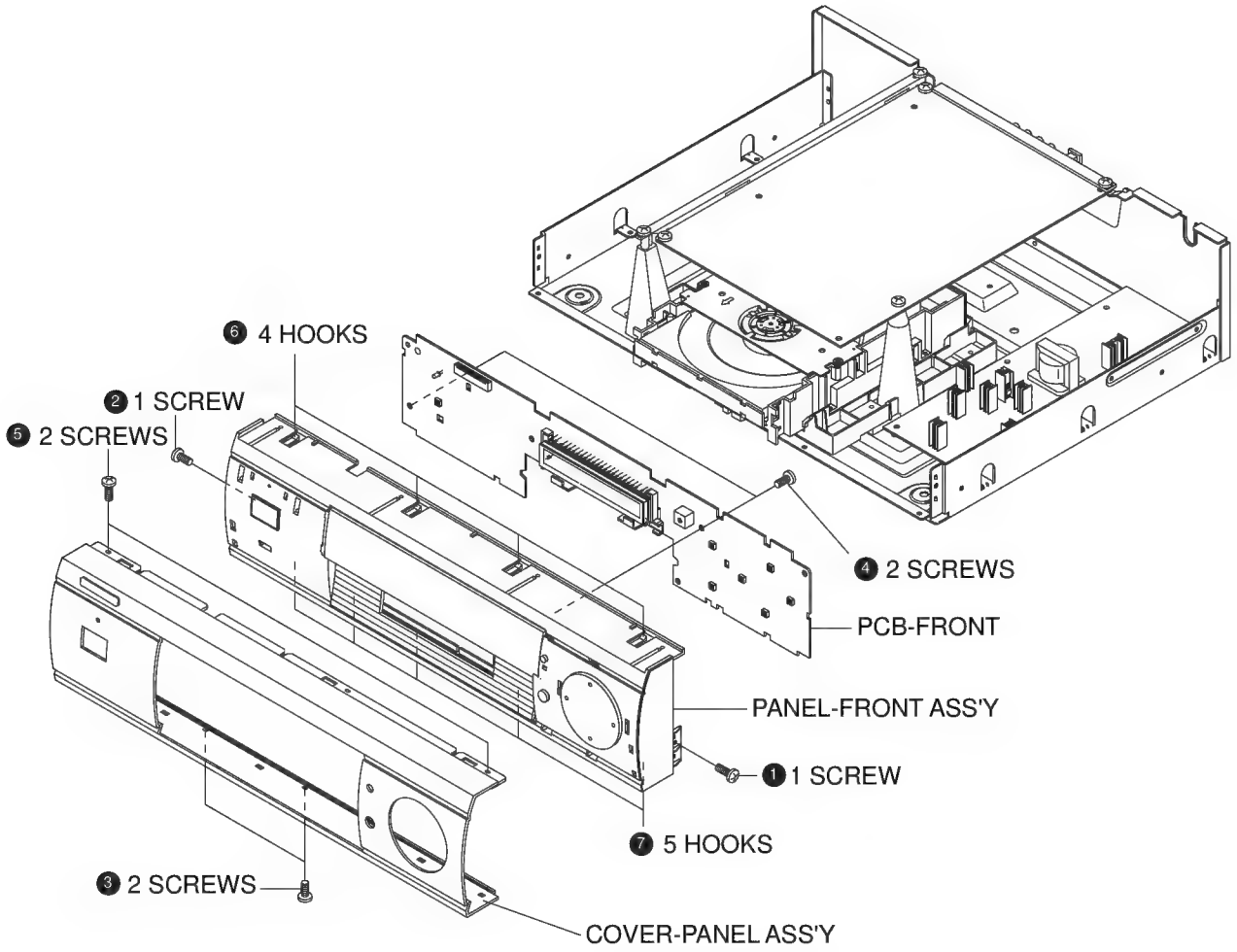


Fig. 5-10

5-2-4(d) PCB-MAIN, PCB-SMPS

1. Remove 4 screws ❶ to fix PCB-MAIN.
2. Remove 2 Holder-PCB ❷ inserted in PCB-MAIN and lift up PCB-MAIN.
3. Remove 3 screws ❸ from PCB-SMPS.
4. Remove 3 Spacer-PCB ❹ inserted in PCB-SMPS and lift up PCB-SMPS.
5. Remove 2 screws ❺ to fix BRKT-PCB ass'y.

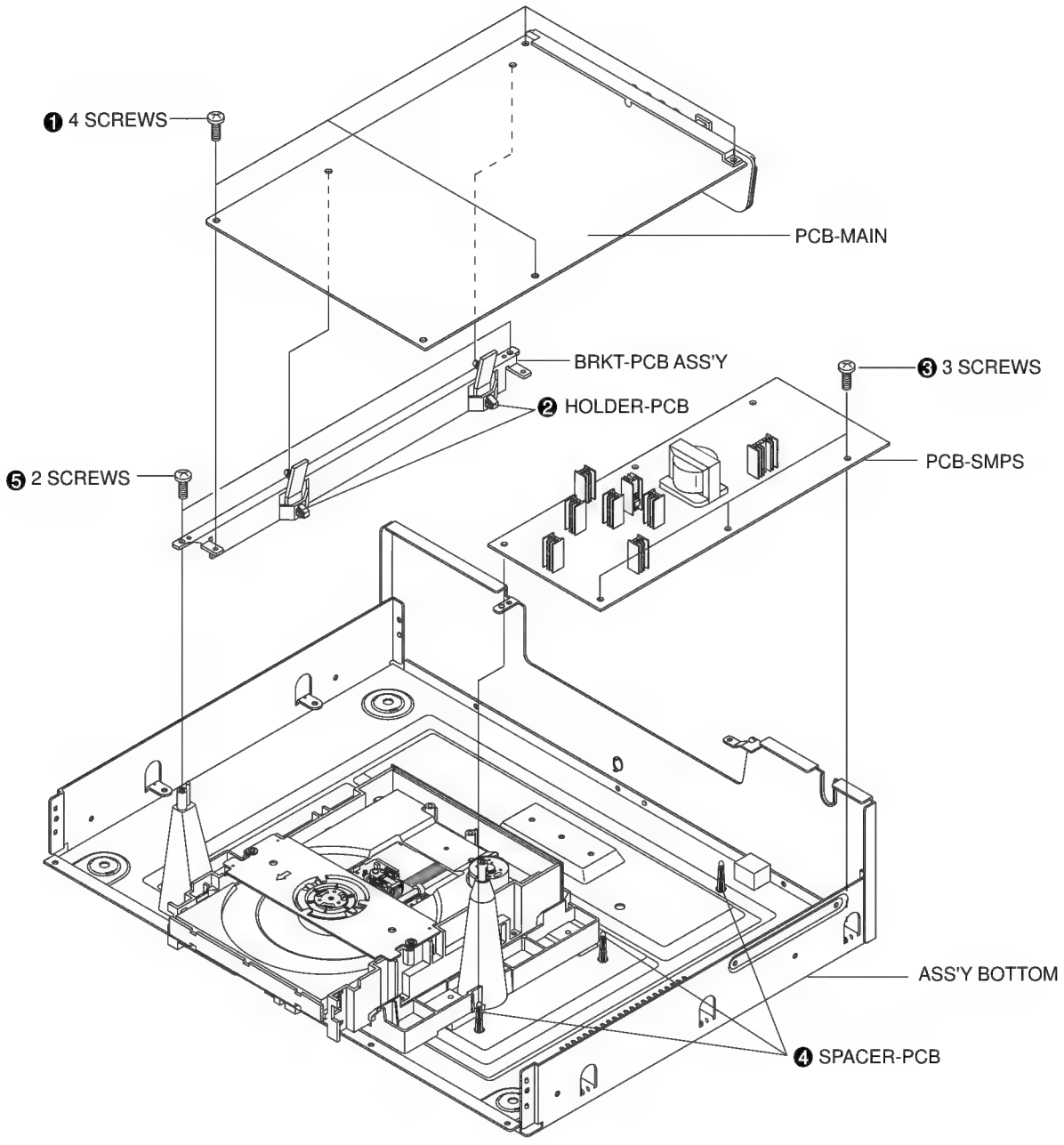


Fig. 5-11

5-2-5(e) Deck, Frame-chassis

1. Remove 4 screws ❶ from the deck and lift it up.
2. Remove 4 screws ❷ from the frame-chassis and lift it up.

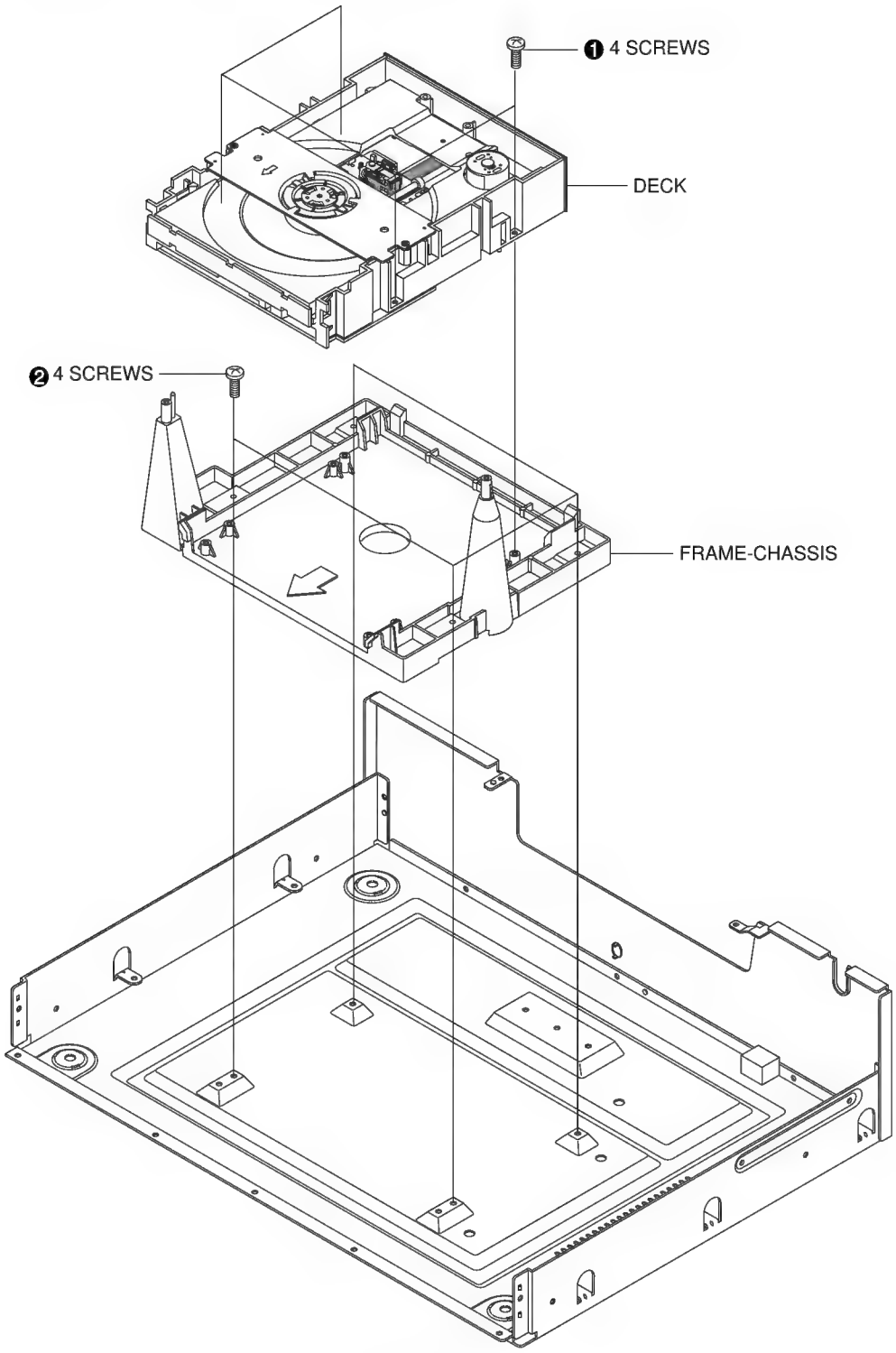


Fig. 5-12

5-2-2 PCB Locations

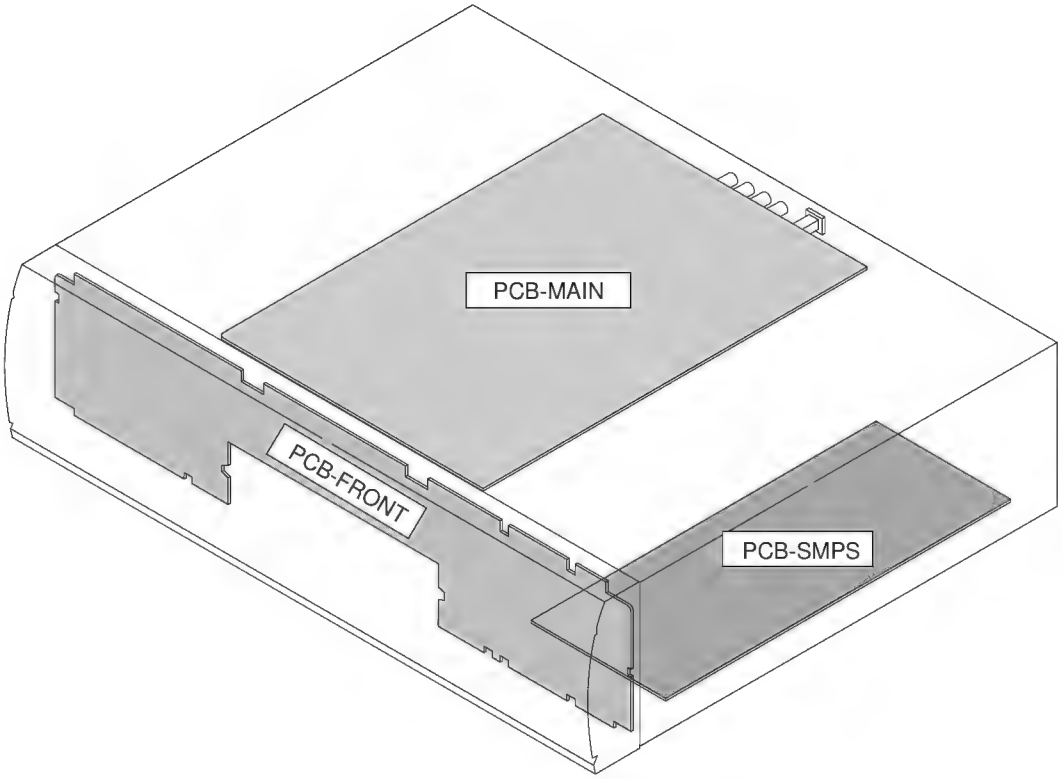


Fig. 5-13

5-2-3 Connector Connection

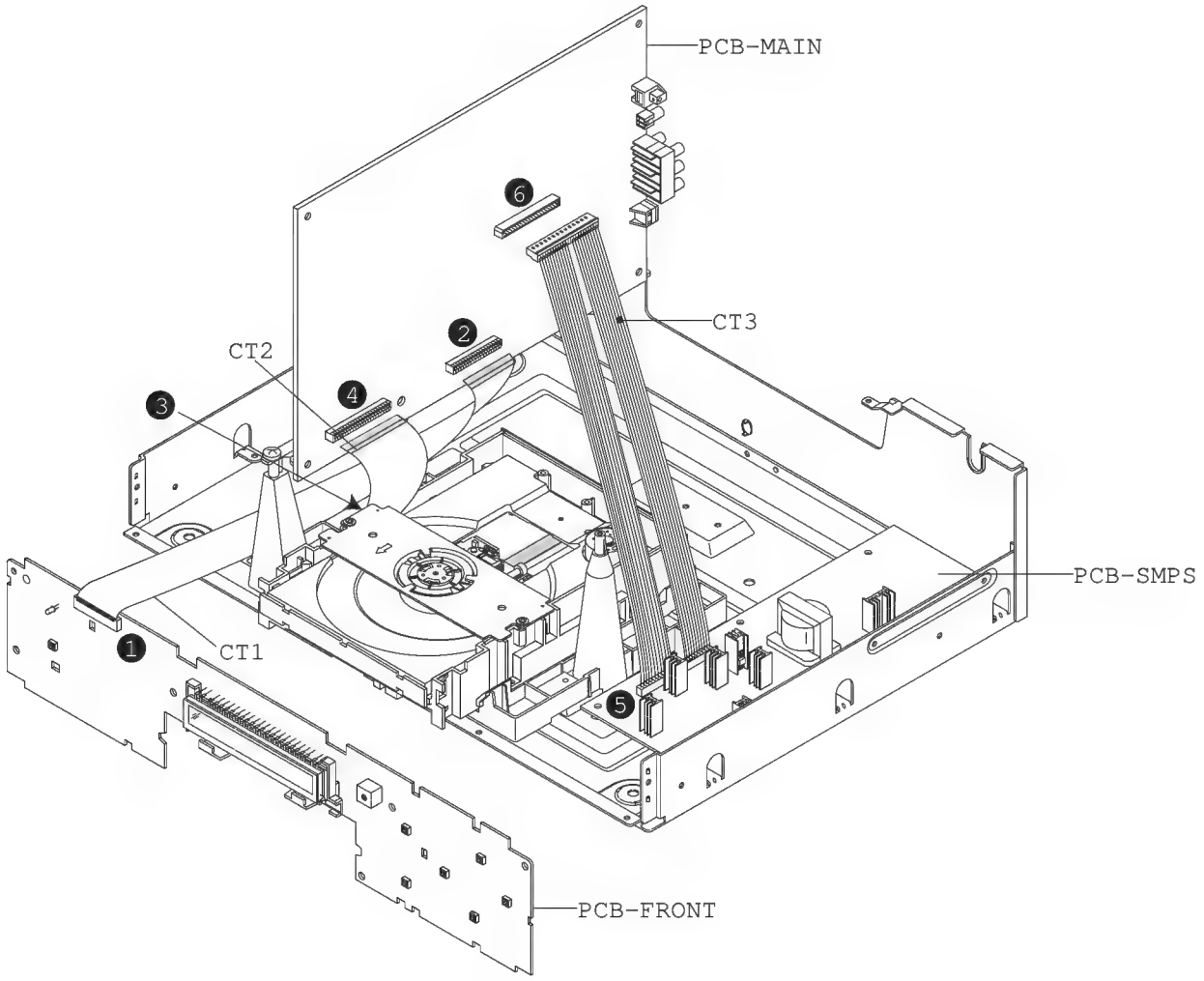


Fig. 5-14

No.	Connector wafer No.	Direction	Connector wafer No.
1	FJP1	CT1 → PCB-MAIN	DCN1
2	DCN1	PCB-FRONT	FJP1
3	CN5	CT2 → PCB-MAIN	CN1
4	CN1	DECK	CN5
5	PCN02	CT3 → PCB-MAIN	PCN1
6	PCN1	PCB-SMPS	PCN02

5-3 Deck Disassembly (Common to 907/927)

5-3-1 Tray

1. Remove 2 screws ❶ and lift up the ass'y-deck clamper ❷ .
2. Insert a clip into Emergency hole, and push Gear-Cam Center ❸ . When the tray ❹ comes out a little, pull it in direction of arrow "C".
3. Pull the tray ❹ to disassemble, while simultaneously pushing the hook ❺ , ❻ in direction of arrow "A", "B".

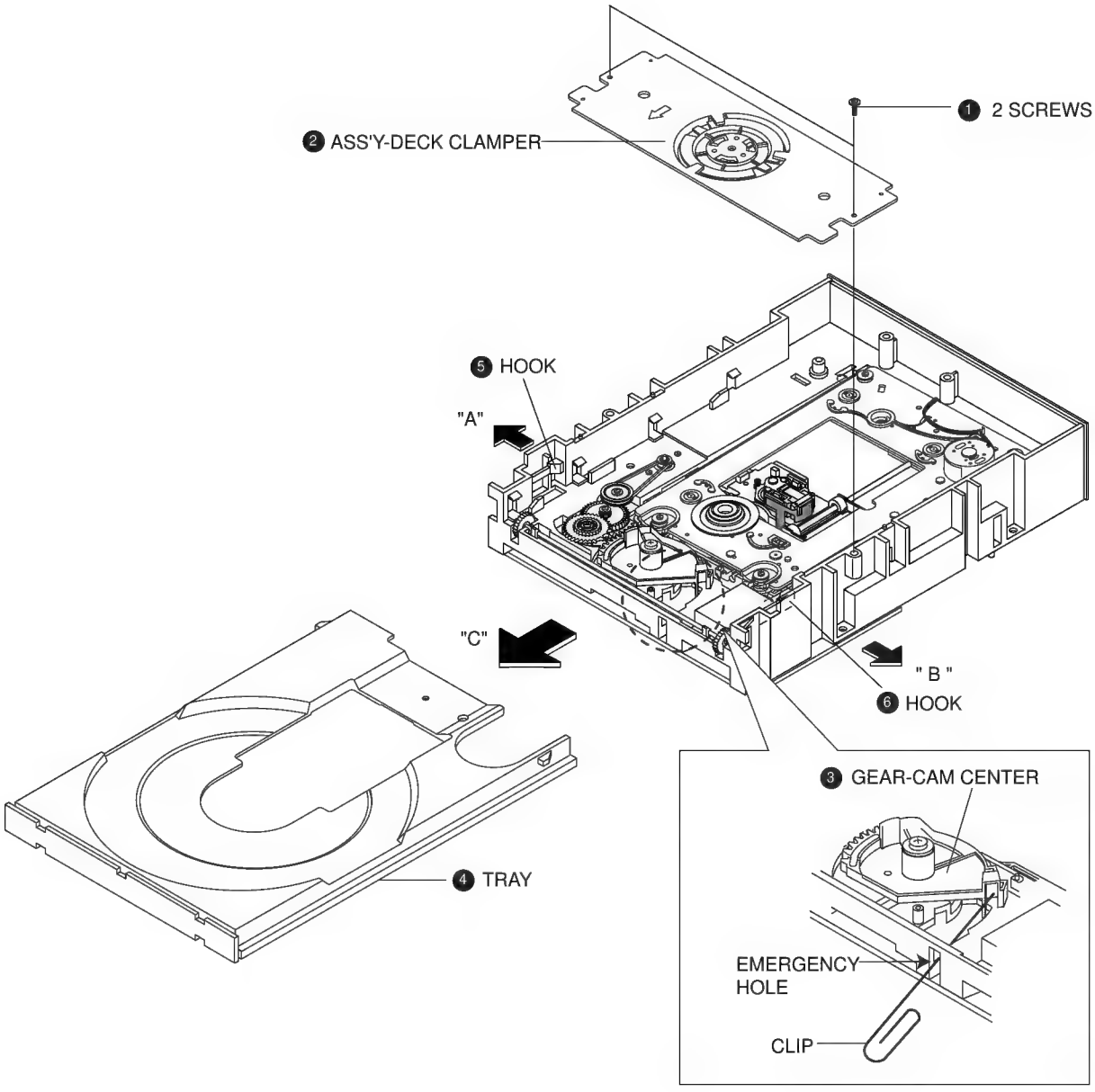


Fig. 5-15

5-3-2 Ass'y-Deck DVD

1. Remove 2 screws ❶ and disassemble the ass'y-PCB deck ❷ .
2. Disassemble the ass'y-deck DVD ❹ in direction of arrow "B", while simultaneously pushing the hook ❸ in direction of arrow "A".

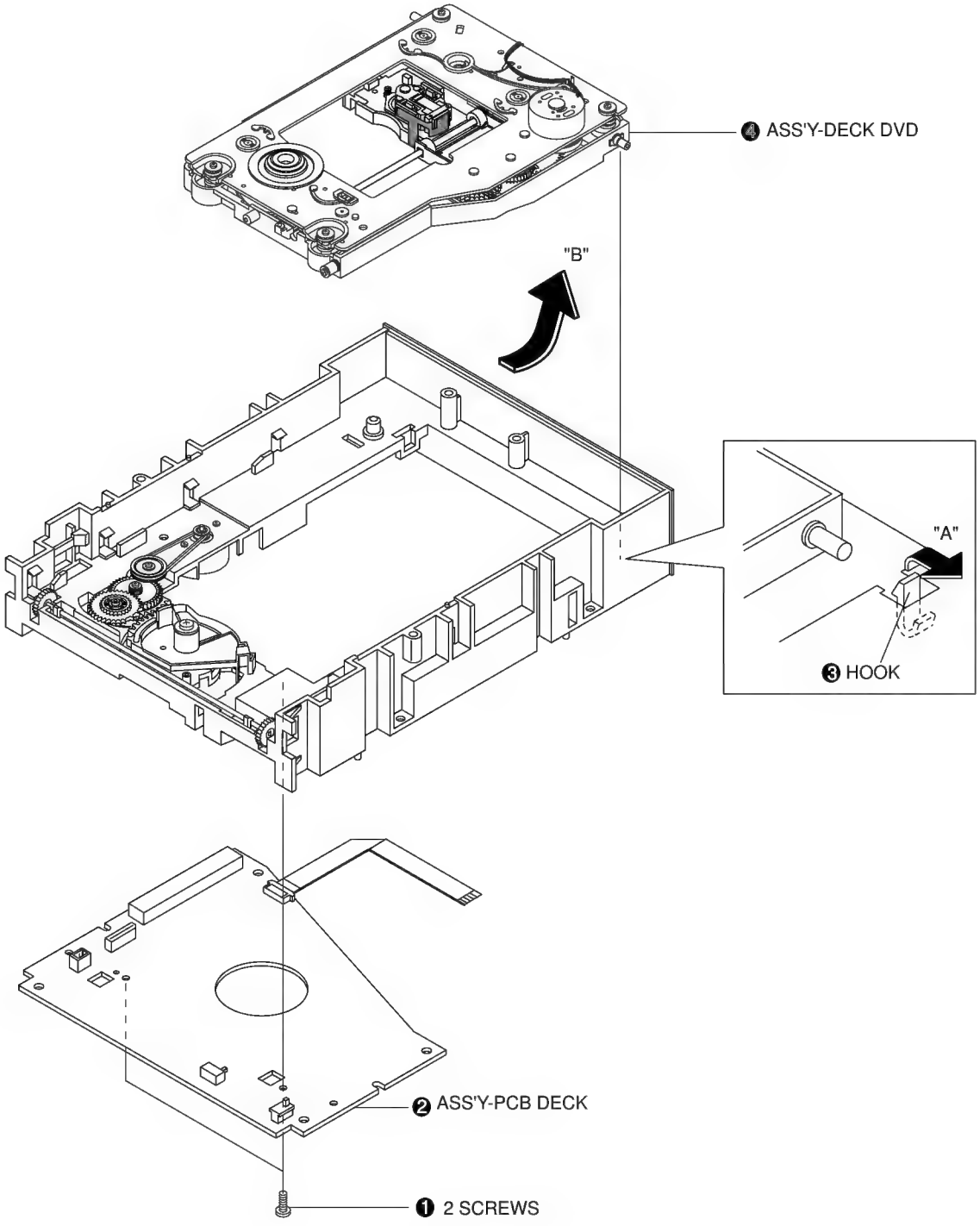


Fig. 5-16

5-3-3 Chassis-Main parts

1. Lift up the gear-tray ❶ , remove 1 screw ❷ and lift up the gear-cam center ❸ .
2. Lift up the belt-pulley ❹ , remove 1 screw ❺ and lift up the pulley-gear ❻ .
3. Remove 1 screw ❼ and lift up the gear-tray A ❽ and gear-cam sub ❾ .
4. Remove 2 screws ❿ and disassemble the ass'y-motor load ⓫ .
5. Remove 1 screw ⓬ and disassemble the lever-open S/W ⓭ .
6. Lift up the shaft-syncro ⓮ and remove the 2 gear-syncro ⓯ in both directions.

Assembling : Adjust the shaft end of motor-feed so that it is exactly equal to the height of the hump in gear pole of ass'y-gear magnet.

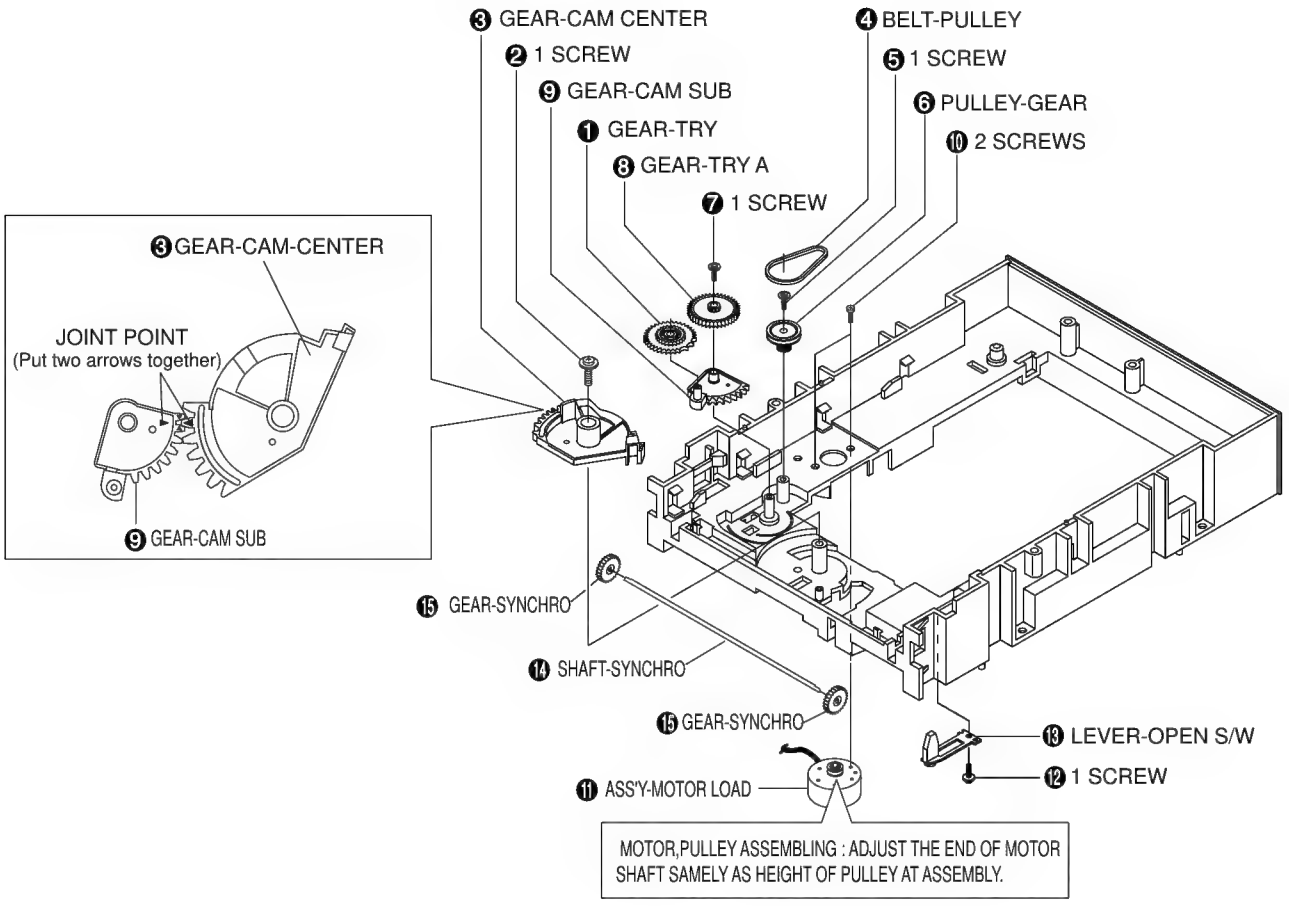


Fig. 5-17

5-3-4 Ass'y deck

1. Remove 4 screws ❶ .
2. Lift up the ass'y-deck ❷ .

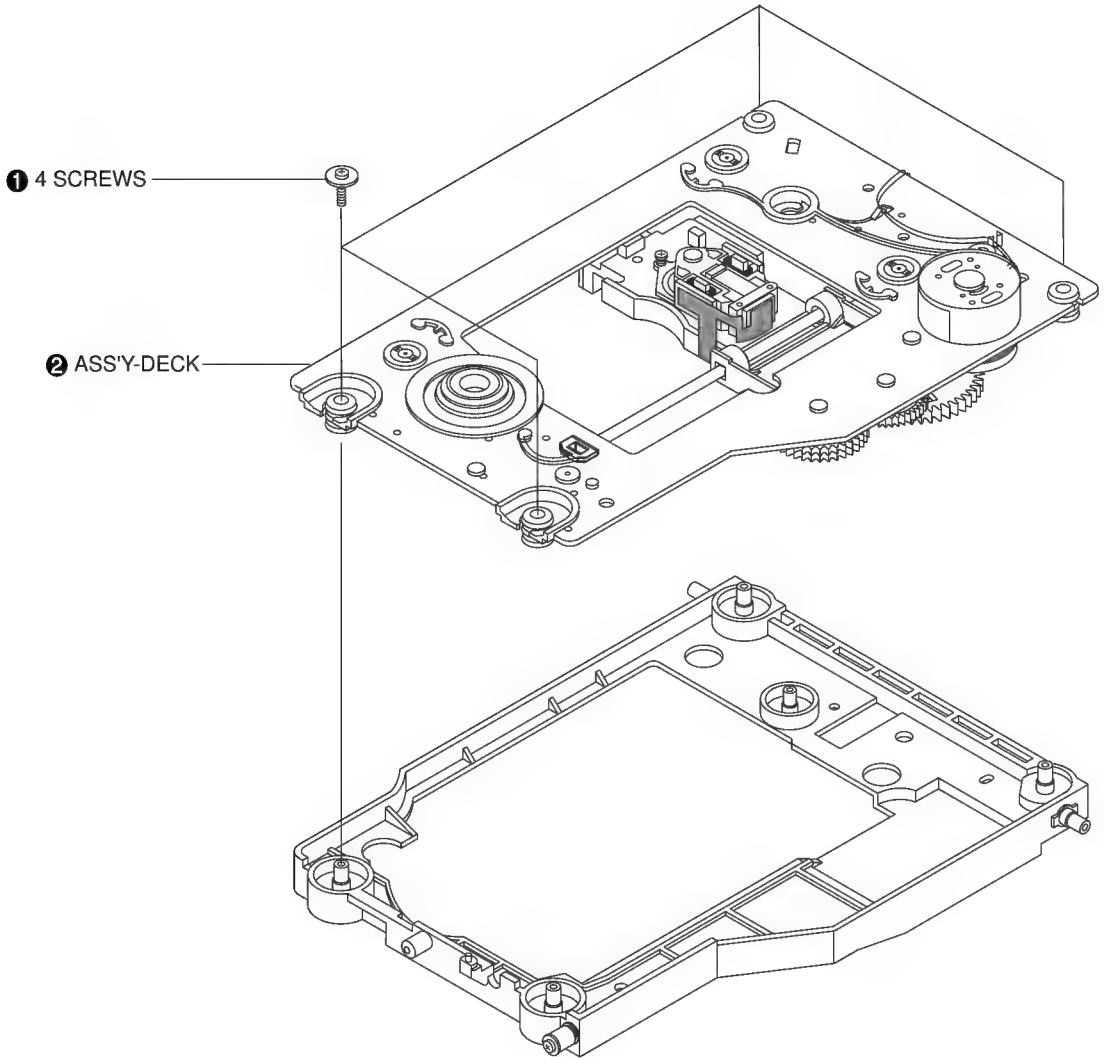


Fig. 5-18

5-3-5 Ass'y-Deck parts

1. Remove 3 screws ❶ and disassemble 3 holder-cams ❷ .
2. Disassemble the rack-slide ❼ and ass'y-pickup ❺ , 2scrrws ❻ while simultaneously removing the shaft-P/U-L ❸, shaft-P/U-R ❹ .
3. Remove 3 screws ❽ and disassemble the ass'y-motor spind le ❾ .
4. Remove the washer-plain ❿ and disassemble the ass'y-gear feed AU/AL ⓫ .
5. Remove the washer-plain ⓬ and disassemble the gear-feed B ⓭ .
6. Remove the washer-plain ⓮ and disassemble the ass'y-gear feed CU/CL ⓯ .
7. Disassemble the ass'y-gear magnet ⓰ .
8. Remove 2 screws ⓰ and disassemble the ass'y-PCB hall sensor ⓱ .
9. Remove 1 screw ⓲ and disassemble the motor-feed ⓳ .

Assembling : Adjsut the shaft end of motor-feed ❶ so that it is exactly equal to the height of the hump in gear pole of ass'y-gear magnet.

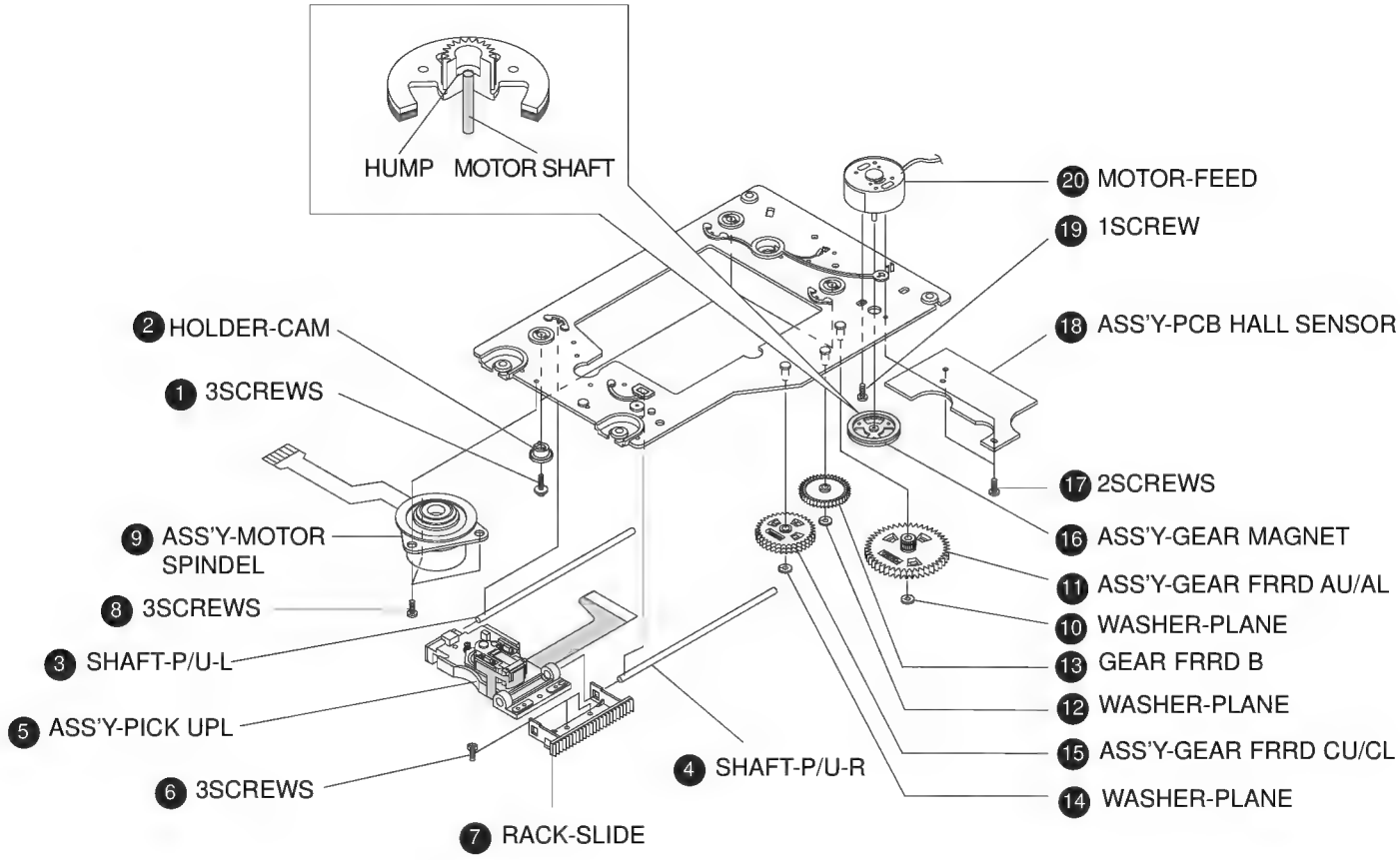


Fig. 5-19

MEMO

7. Circuit Descriptions

7-1 SMPS

7-1-1 Comparison between linear power supply and SMPS

7-1-1(a) LINEAR

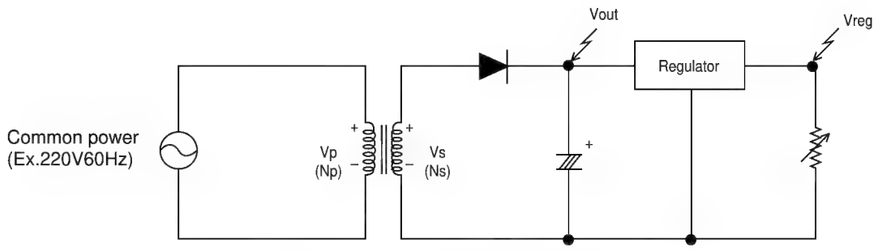
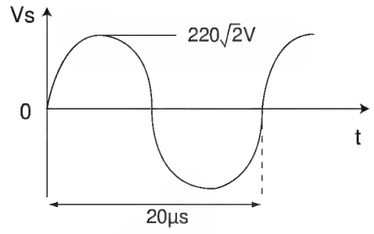


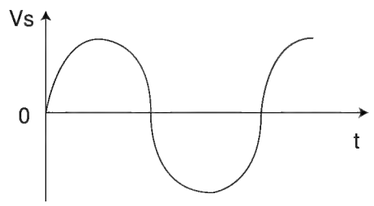
Fig. 7-1 Linear Power Supply

◆ Waveform/Description



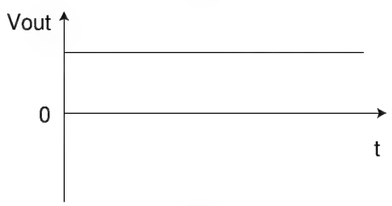
Input : Common power to transformer(Vp)

Fig. 7-2



The output Vs of transformer is determined by the ratio of 1st Np and 2st Ns.
Vs = (Ns/Np) x Vp

Fig. 7-3



Vout is output (DC) by diode and condensor.

Fig. 7-4

◆ Advantages and disadvantages of linear power supply

a. Advantages :
Little noise because the output waveform of transformer is sine wave.

b. Disadvantages :
» Additional margin is required because Vs is changed (depending on power source). (The regulator loss is caused by margin design).
» Greater core size and condensor capacity are needed, because the transformer works on a single power frequency.

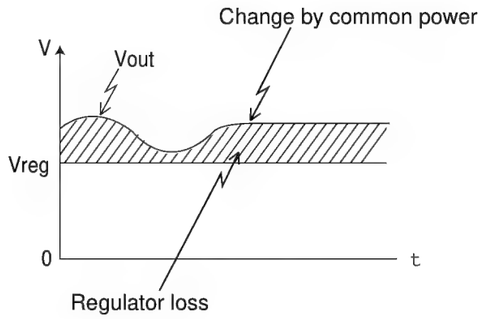


Fig. 7-5

7-1-1(B) SMPS(PULSE WIDTH MODULATION METHOD)

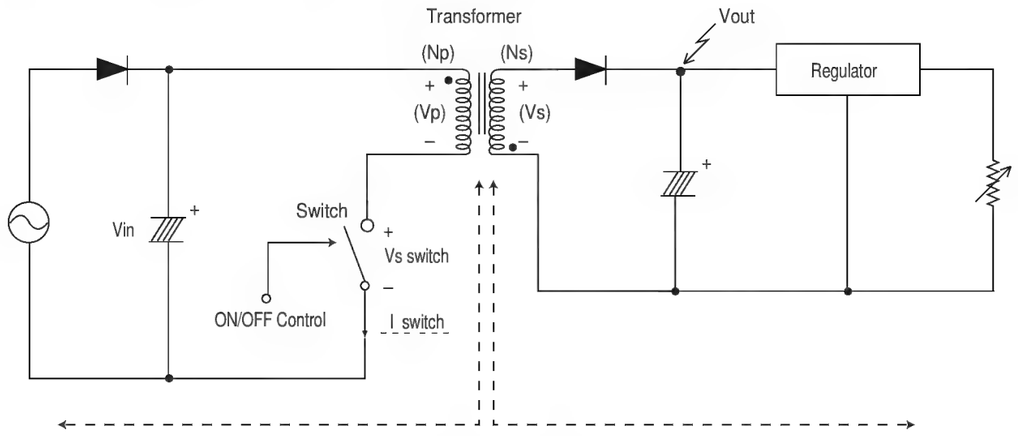


Fig. 7-6 SMPS

◆ Terms

- 1st : Common power input to 1st winding.
- 2nd : Circuit followings output winding of transformer.
- f(Frequency) : Switching frequency(T : Switching cycle)
- Duty : (Ton/T) x 100

7-1-2 Circuit description(FLY-BACK PWM(Pulse Width Modulation) control)

7-1-2(a) AC power rectification/smoothing terminal

- PD01,PD02,PD03,PD04 : Convert AC power to DC(Wave rectification)
- PO03 : Smooth the voltage converted to DC(Refer to VIN of Fig. 7-7)
- PC01, PC02, PC10, PC11, PC12, PC13, PL01, PL02, PL03 : Noise removal at power input/output
- PVA1 : SMPS protection at power surge input
  (PVA1 pattern open is to remove noise)
- PR10 : Rush current limit resistance at the moment of power cord insertion.
  » Rush current = (AC input voltage x 1.414 - Diode drop voltage) / Pattern resistance + PL02,01 resistance + PC10 resistance + PR10) (AC230V based : approx. 26A)
  » Without PR10, the bridge diode might be damaged as the rush current increases.

7-1-2(b) SNUBBER circuit : PR15, PR16, PC04, PD05, PD11, PR17

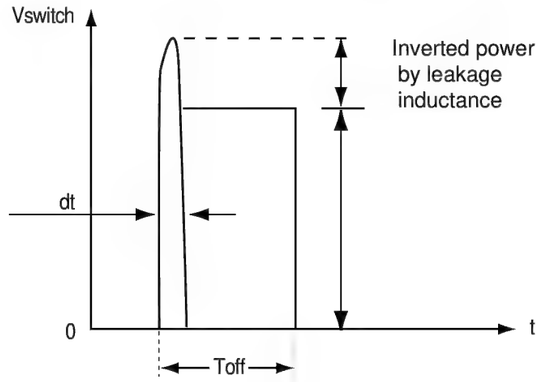


Fig. 7-7

- Prevent residual high voltage at the terminals of switch during switch off/Suppress noise.
  High inverted power occurs at switch (PIC1) off, because of the 1st winding of transformer: (V=L1xdi/dt. LI : Leakage Induction)
  A very high residual voltage exists on both terminals of PIC1 because dt is a very short.
- SNUBBER circuit protects PIC1 from damage through leakage voltage suppression by RC, (Charges the leakage voltage to PD11 and PC04, and discharges to PR15 and PR16).
- PC05, PL17 : For noise removal

7-1-2(c) PIC1 Vcc circuit

- PR11, PR12, PR13, PR14 : PIC1 driving resistance (PIC1 works through driving resistance at power cord in)
- PIC1 Vcc : PR18, PD12, PC06

1) Use the output of transformer as Vcc, because the current starts to flow into transformer while PIC1 is active.
2) Rectify to PD12 and smooth to PC06.
3) Use the output of transformer as PIC1 Vcc : The loads are different before and after PIC1 driving.
(Vcc of PIC1 decreases below OFF voltage, using only the resistance due to load increase after PIC1 driving.)

7-1-2(d) Feedback control circuit

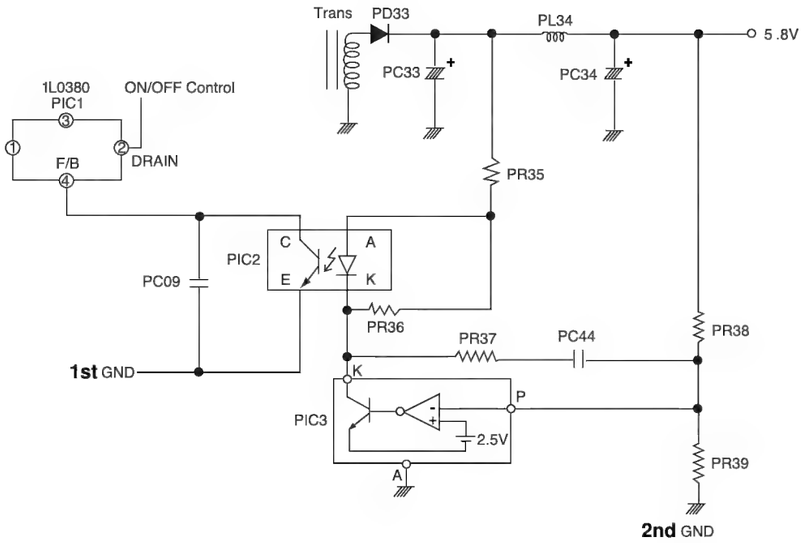


Fig. 7-8

- F/B terminal of PIC1 determines output duty cycle.
- C-E(Collector-Emitter) of PIC2 and F/B potential of PIC1 are same.

◆ Operation descriptions

a. Internal OP-Amp '+' base potential of PIC3 is 2.5V and external "-" input potential is connected with PR38 and PR39 to maintain Vout of 5.8V. (Vout = ((PR36 x PR39) / PR39) x 2.5V)
b. If load of 5.8 V terminal increases(or AC input voltage decreases) and Vout decreases below 5.8V, then : PIC3 'P' potential down below 2.5V --> PIC3 A-K of base current down --> PIC3 of A-K current down --> PIC2 Diode current down --> PIC2 C-E current down --> PIC2 C-E voltage up --> PIC1 F/B voltage up --> Out Duty up --> Transformer 1st current up --> Transformer 1st power up --> Vout up --> Maintain Vout 5.8V
c. If load of 5.8 V terminal decreases(or AC input voltage rises) and Vout rises above 5.8V, then : Reverse sequence of the above description Æ Duty down Æ Vout down Æ Maintain 5.8V (i.e., the feedback to maintains 5.8V).
   - PR35, PR36 : Reduce 5.8V overshoot
   - PR37, PC44 : Prevent PIC3 oscillation(for phase correction)
   - PC09 : Adjust feedback response rate

7-1-3 Internal block diagram

7-1-3(a). Internal block diagram of SMPS circuit

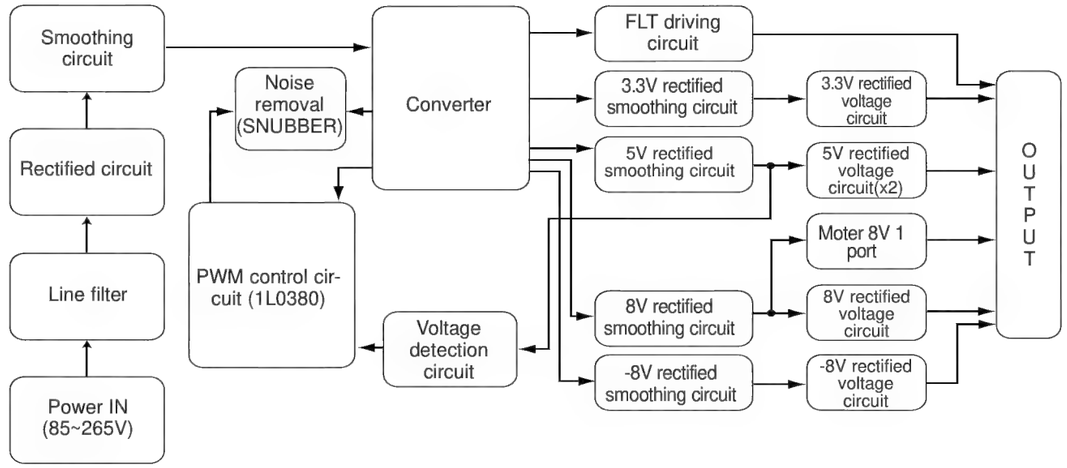


Fig. 7-9

7-1-3(b). PIC1(1L0380) internal block diagram

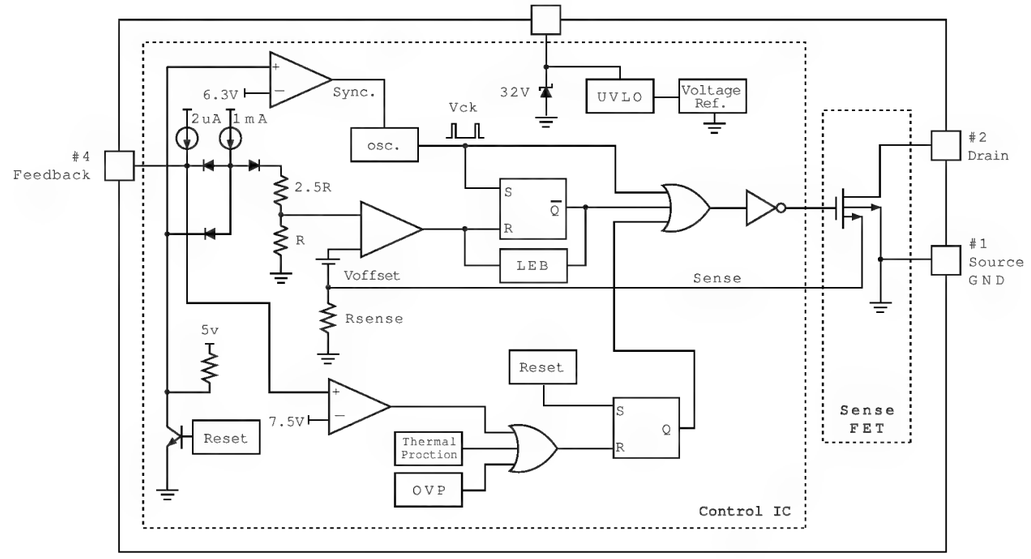


Fig. 7-10

7-2 RF circuit description

7-2-1 RIC1(TA1236F)

TA1236F is combined with TA1253FN, TC9240F and TC90A19F as bipolar IC developed for DVD SERVO system. Main features include DVD waveform equalizing, CD waveform equalizing, focus error signal generation, 3-beam tracking error signal generation, laser power control, etc. after receiving the pick-up output converted into I/V.

7-2-1(a) Basic potentiometer

TA1236F uses a single power method and each circuit is based on V_{REF} of 2.1V. Note :
symmetrical about GND for V_{REF} because V_{REF}(pin20) terminal is needed for IC, which uses the peripheral V_{REF} and $2V_{REF}$ output(pin18).

7-2-1(b) RF signal

Fig. 7-11 shows the flow of signal generated by the pick-up.
A, B, C, D signals detected from pick-up are converted in to RF signal(A+B+C+D) via RF summing AMP.
RF signal is inputted to RFN(pin55) among input terminals and RFP(pin54) is used for AC ground.

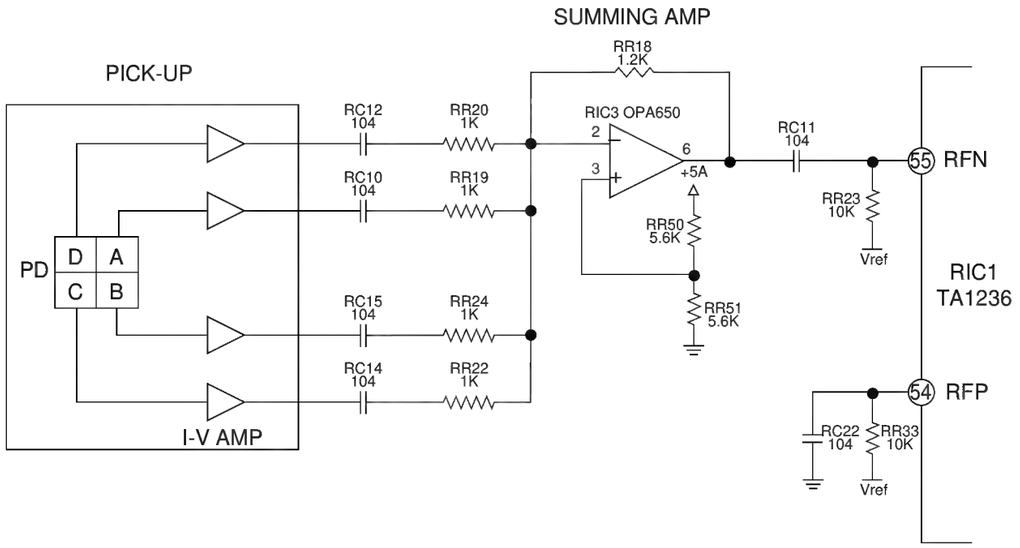


Fig. 7-11

Fig. 7-12 shows the waveform-equalizing block diagram for the RF signal.
It outputs to EQout(pin 46) terminal by initially changing switching AMP gain of DVD and CD, and then adjusting the level in VCA. It controls VCA gain by means of RF gain(pin 48) and interfaces with PWM signal, (output from RFGC terminal of TC9420F, via low-pass filter to constitute a loop for adjustment of constant amplitude). The gain in EQout is 1.0 for DVD and 1.67 for CD.

EQout terminal is connected with EQin(pin 45) externally, and inputs into DVD EQ and CD EQ(Waveform equalizing circuit).

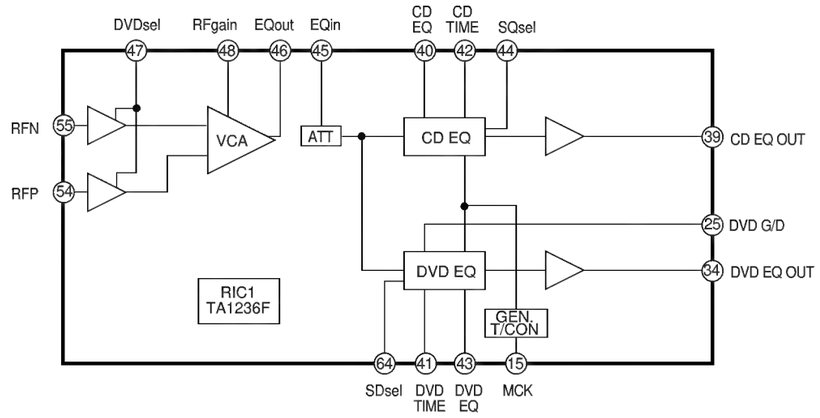


Fig. 7-12

The control parameters of DVD EQ and CD EQ are as follows.

1) DVD EQ control parameter

- DVDEQ(pin 43) : Changes the gain of peak frequency with EQ frequency characteristic. Convert PWM signal, output from TC90A19F, into DC via low-pass filter.
- DVDTIME(pin 41) : Changes the peak frequency with EQ frequency characteristic. Convert PWM signal, output from TC90A19F, into DC via low-pass filter.
- S/Dse1(pin 64) : Changes the peak frequency (like DVD TIME) as 2d control. (Switched according to regeneration speed ratio of single/double layer).
- MCK(pin 15) : Input the base clock and link the peak frequency with it. The amplitude of MCK might be small (500mVp-p).
- DVDGD(pin 25) : Changes the group delay characteristics with EQ frequency characteristic.

2) CD EQ control parameter

- CD EQ(pin 40) : Changes the gain of peak frequency with EQ frequency characteristic. The constant DC is supplied to a resistive voltage divider.
- CD TIME(pin 42) : Changes the peak frequency with EQ frequency characteristic. The constant DC is supplied to a resistive voltage divider.
- S/Qse1(pin 44) : Changes the peak frequency (such as CD TIME) as 2d control. (Switched according to play linear velocity ratio of quadruple/single rate. Set to '0' because only one rate is vaild in this system).

CD and DVD signals are equalized according to the above control parameters ,and then output to CD EQ OUT (pin39) and DVD EQ OUT (pin34). Then, CD signal is transferred to TC9420F (pin 38), DVD signal is sent to TC90A19F(pin 50) and detected.

7-3 System control

7-3-1 Outline

The main micom peripheral circuit is composed of 16bit Micom(MIC1,TMP93CS41), 2M PROM (MIC2,AM27C020 for Microcode and data save, 1M SRAM(MIC3, KM681000) for data read/write on running, 512 byte EEPROM (MIC5, IS24C02)for permanent storage of data needed at power off, MIC4(74AC573) to latch only address in the bus where address and data are mixed, address decoder (MIC6, 74HC00) for selection of external device chip and 20MHz clock oscillator for micom operation. The micom(MIC1, TMP93CS41) mounted in main board analizes the key commands of front panel or instructions of remote control through communication with micom(FIC1, LC86P6232) of front and controls the devices on board to execute the corresponding commands after initializing the devices connected with micom on board at power on.

7-3-2 Block diagram

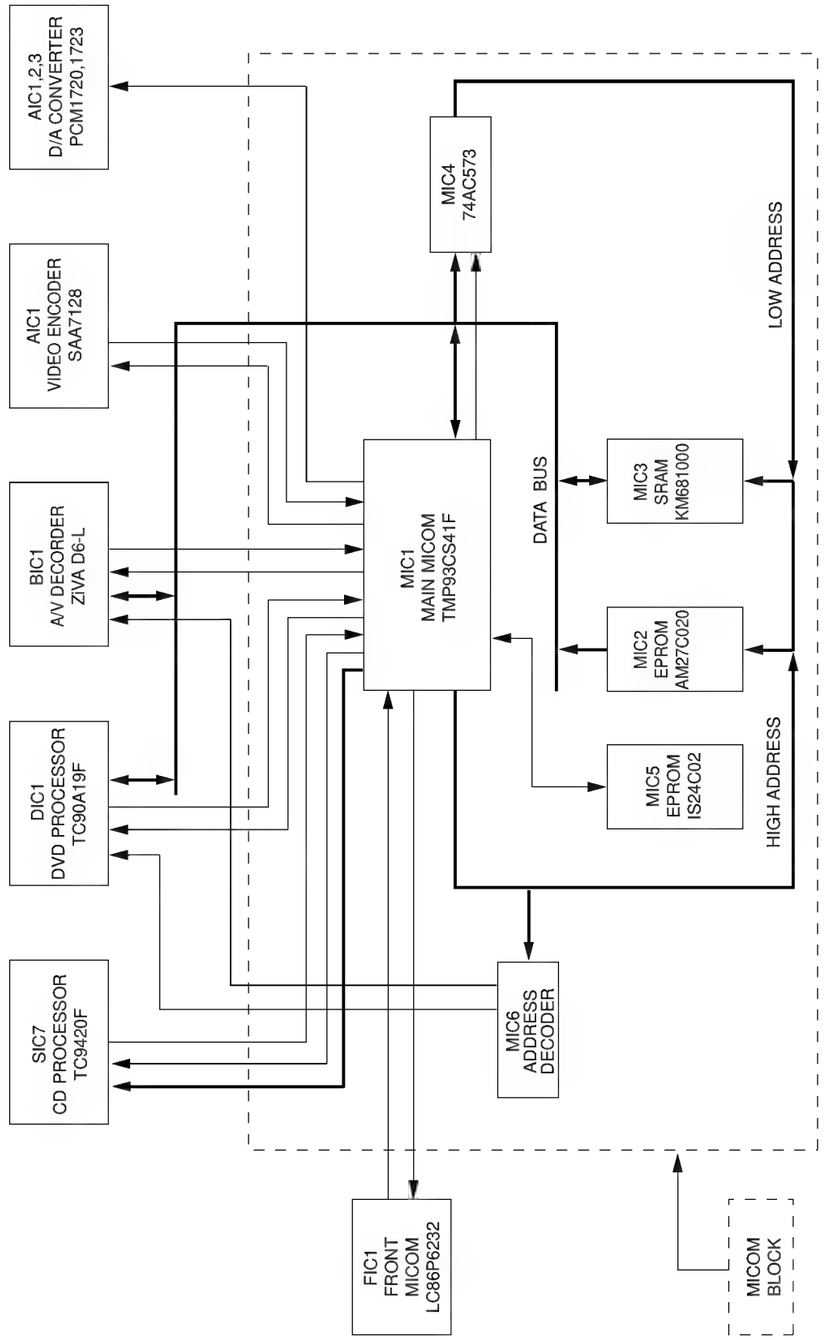


Fig.7-13

7-3-3 Waveform description

The setup time is approx. 18 nsec. at falling edge of ALE(Address Latch Enable) signal, which has enough hold time.
At power of 5V, the min. setup time of MIC4(TC74AC573) is 5 nsec, and min. hold time is 3 nsec. It can be known that data input condition meets setup time and hold time. The eye part of input data in falling edge of ALE signal corresponds to address on the bus where address and data are mixed.

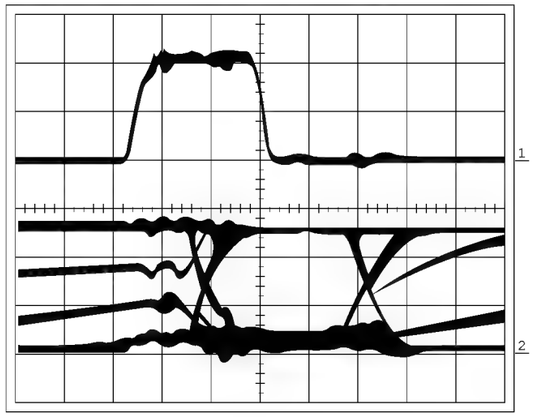


Fig. 7-14

- CH1 : ALE
  (MIC4-11, Address Latch Enable Signal)
- CH2 : HAD0-9
  (Input data of MIC4, Common bus data)

The inclining and rising part indicate floating range of data bus.
That is, there is no operational problem because micom is time area not to access any devices sharing a common bus. The waveform is shown to incline and rise by pull-up resistance and capacitance on PCB pattern.
When micom accesses each device sharing bus, it falls the chip select signal of corresponding chip to (CS1 : MIC2-22, CS2:MIC3-22, /DPCS:MIC6-76, /DVD1CS:BIC1-175) 0 (Low) before trial. So to speak, the bus is used by time-division as shown in Fig 7-16, 17. Two and more devices can't be accessed simultaneously.

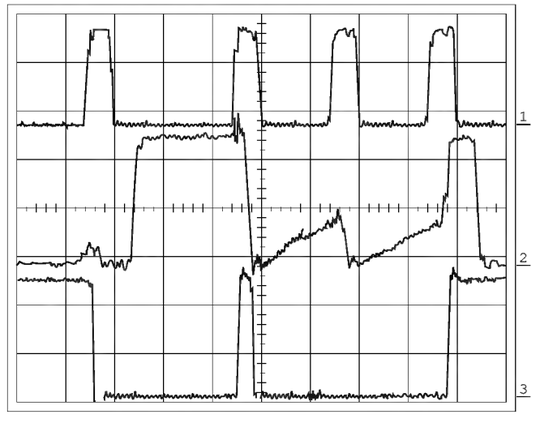


Fig. 7-15

- CH1 : ALE
  (MIC4-11, Address Latch Enable Signal)
- CH2 : HAD0-7 (MIC4-2 to 9, Input data)
- CH3 : HA0-7 (MIC4-19 to 12, Output data)

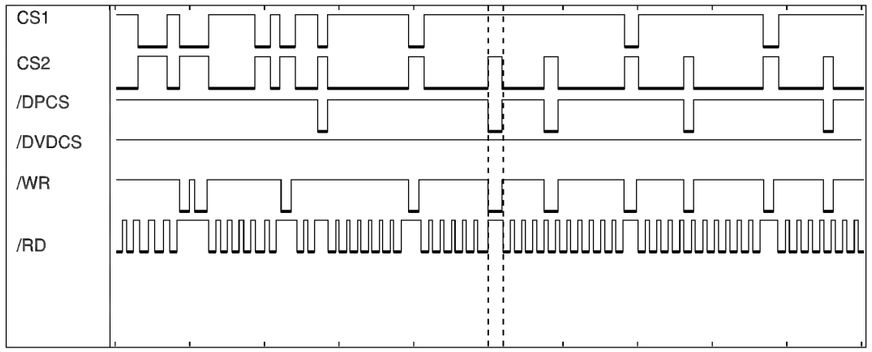


Fig. 7-16

- CH1 : CS1 (MIC3-22, SRAM CHIP SELECT)
- CH2 : CS2 (MIC2-22, EPROM CHIP SELECT)
- CH3 : DPCS (DIC1-12, DVD PROCESSOR CHIP SELECT)
- CH4 : DVDCS (BIC1-175, A/V DECODER CHIP SELECT)
- CH5 : WR (MIC1-73, MICOM OUTPUT WRITE SIGNAL)
- CH6 : RD (MIC1-72, MICOM OUTPUT READ SIGNAL)

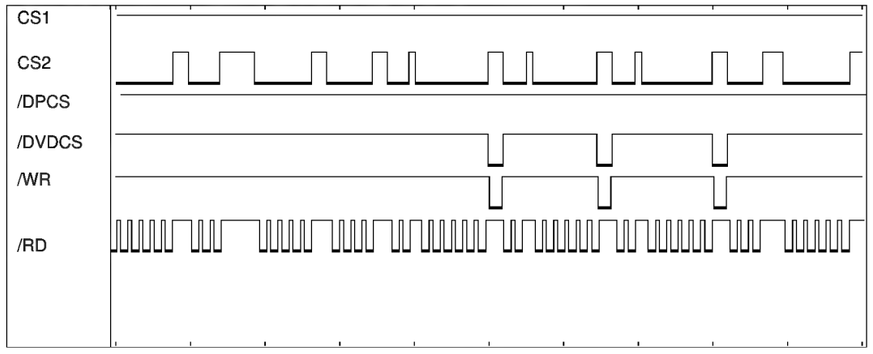


Fig. 7-17

- CH1 : CS1 (MIC3-22, SRAM CHIP SELECT)
- CH2 : CS2 (MIC2-22, EPROM CHIP SELECT)
- CH3 : DPCS (DIC1-12 DVD PROCESSOR CHIP SELECT)
- CH4 : DVDCS (BIC1-175, A/V DECODER CHIP SELECT)
- CH5 : WR (MIC1-73, MICOM OUTPUT WRITE SIGNAL)
- CH6 : RD (MIC1-72, MICOM OUTPUT READ SIGNAL)

7-4 DVD Data Processor

7-4-1 Outline

DIC1(TC90A19F) performs PLL(Phase Locked Loop), Sync detection, demodulation and error correction after converting RF signal inputted at DVD regeneration into digital data.
TC90A19F uses external memory(DIC2, 4M DRAM, KM48C512BLJ) as buffer as well as for error correction and carries out Variable Bit Rate transfer function. VBR function uses the external buffer as buffer to absorb the difference of transfer rate occurring because the transfer rate of disc playback is faster than data transfer rate demanded by MPEG decoder(Video/Audio Signal Process Chip).
In case of general disc refresh, the memory is almost filled up periodically. It is because Write rate to memory after disc playback and signal process is faster than Read rate of MPEG decoder. When the memory is filled, this status is reported by interrupt to main micom, which controls the servo to kick back the pick-up to the previous track after memorizing the last data read from disc until now. It takes some times to jump to the previous track and return to the original position(jump location) again. The memory will have an empty space because MPEG decoder reads out data of memory.
When the memory has an empty space, where data can be processed and written and the pick-up correctly gets to the original location(before kick back location) again, it reads data again and avoids the interrupt of data read previously.
The basic operation repeats to perform (disc data read --> memory full --> move pick-up to previous track --> disc data read --> memory full --> move pick-up to previous track) as described above.

7-4-2 DVD DATA PROCESSOR BLOCK DIAGRAM

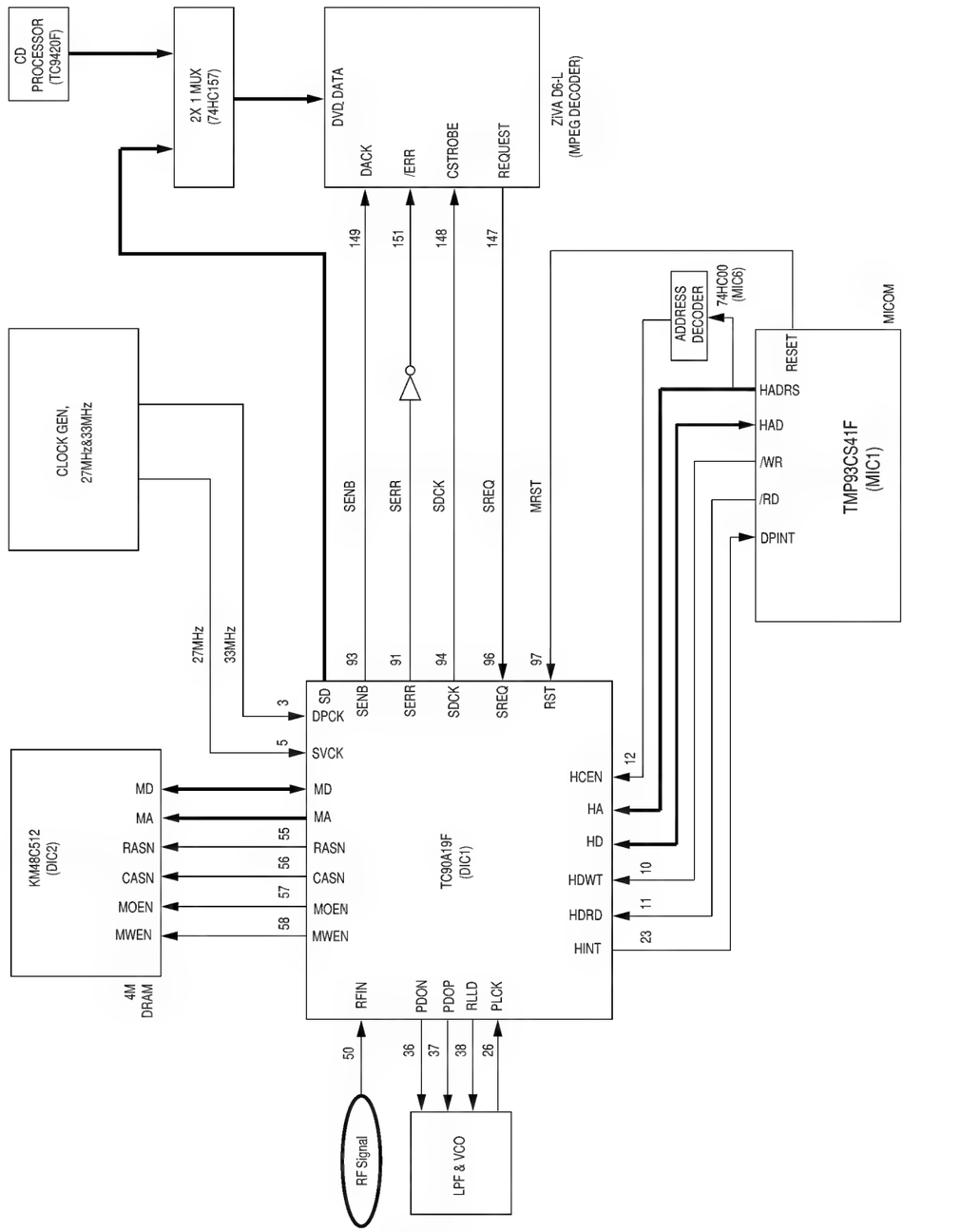
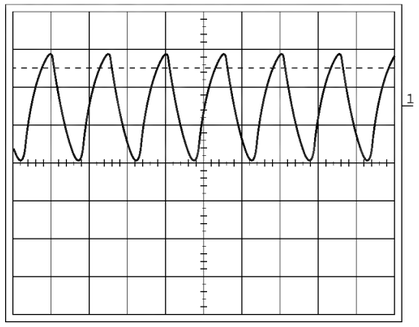


Fig. 7-18

7-4-3 Waveform description

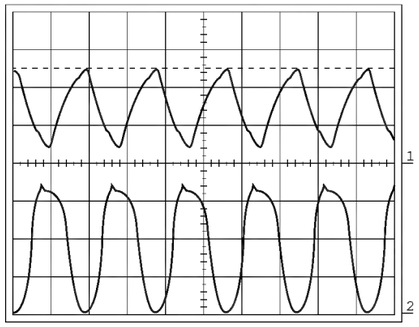
It is used for internal digital signal process as 33MHz clock input waveform of DIC1 (TC90A19F) and carries out swing in 1.4V level on the basis of DC level 1.65V.



• CH1 : DPCK1(DIC1-3, 33MHz input clock)

Fig. 7-19

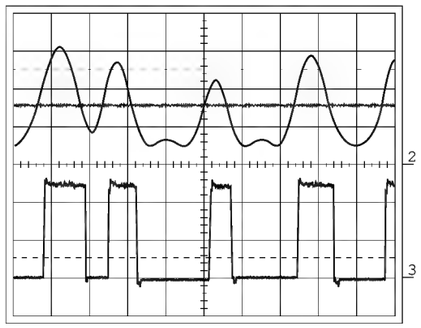
It is used for PLL and CLV control as 27MHz servo clock input and output waveform of DIC1. The input swings in approx. 2V of amplitude and the output swings in 3.3V.



• CH1 : SVCKI (DIC1-5)
• CH2 : SVCKO (DIC1-6)

Fig. 7-20

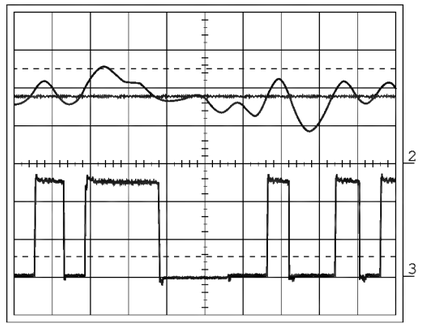
CH1 is RF signal waveform inputted to DIC1 and inputted with 2.5V of amplitude on the basis of approx. 1.65V level. If RF signal is higher than slice level, CH2 of slice level is cut logic “1”(HIGH) and if lower, logic “0”(LOW) thus converted into digital data. CH3 indicates a waveform that RF signal is cut by slice level and converted into digital data.



• CH1 : RFIN(DIC1-50, RF Input signal)
• CH2 : SLCO (DIC1-42, Slice level)
• CH3 : ED7 (DIC1-34, Sliced data of RF signal)

Fig. 7-21

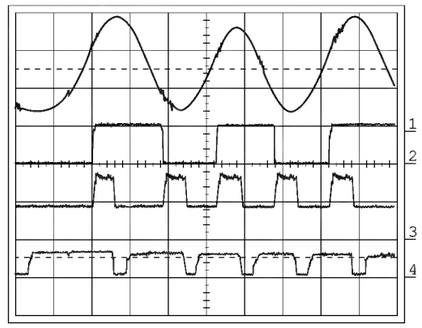
CH1 is RF signal waveform at refresh the error area of disc. It shows RF waveform swing lower than slice level. At the end, this part is displayed as error which is recovered to the original data by error correction signal of DIC1.



• CH1 : RFIN(at refreshing small error area of disc)
• CH2 : SLCO (Slice level)
• CH3 : ED7 (Sliced and outputted data of RF signal)

Fig. 7-22

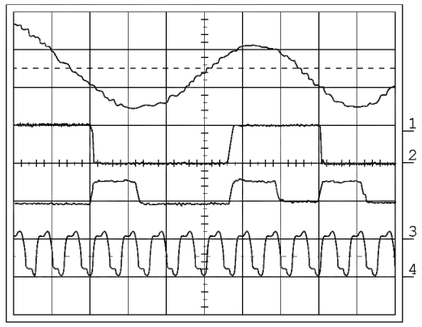
It shows error signal output, comparing PLL clock and phase difference in DIC1 when RF signal is inputted. The phase difference signals is inputted into VCO after summing in external PLL circuit of DIC1. VCO changes PLL clock frequency according to input voltage.
The middle frequency of external PLL circuit is approx. 27MHz and a clock(DIC1-26) locked by PLL on the basis of 27MHz may be shown at DVD playback.



• CH1 : RFIN(DIC1-50, RF Input signal)
• CH2 : SLCO (DIC1-34, Sliced data)
• CH3 : PDON (DIC1-36, Phase difference signal)
• CH4 : PDOP (DIC1-37, Phase difference signal)

Fig.7-23

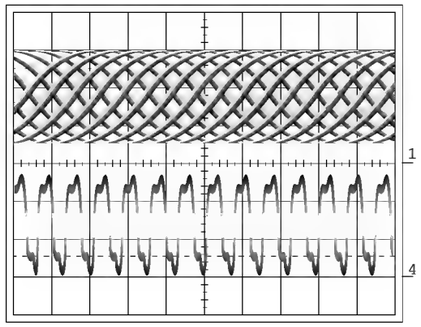
PLL lock at DVD playback



• CH1 : RFIN(DIC1-50, RF Input signal)
• CH2 : SLCO (DIC1-34, Sliced data)
• CH3 : PDON (DIC1-36, Phase difference signal)
• CH4 : PLCK (DIC1-26, PLL clock)

Fig. 7-24

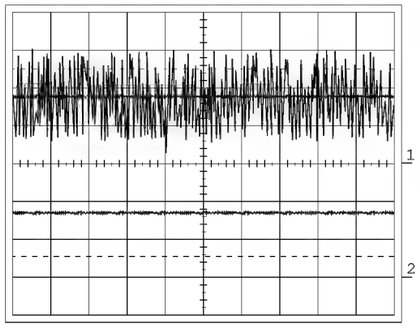
A clock locked by PLL on the basis of input RF signal, PLL clock and trigger may be shown at DVD playback. The eye of RF signal is open in PLL lock state.



- CH1 : RFIN(DIC1-50, RF Input signal) (Vp-p is approx. 2.5V)
- CH4 : PLCK (DIC1-26, PLL clock)

Fig. 7-25

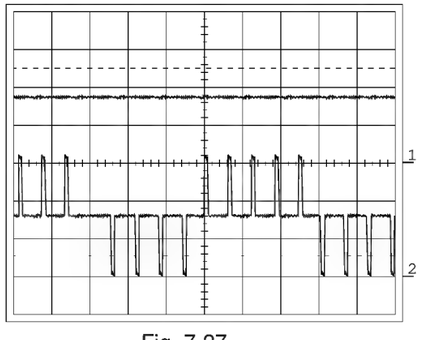
It shows RF signal and RLLD signal waveform at DVD refresh and RLLD waveform is regular as 1.65V. If a serious error occurs in disc, RLLD signal is outputted as correction signal and enters PLL control system after summing with phase difference signal.



- CH1 : RFIN(DIC1-50, RF Input signal)
- CH2 : RLLD (DIC1-38, RLLD signal at disk refresh)

Fig. 7-26

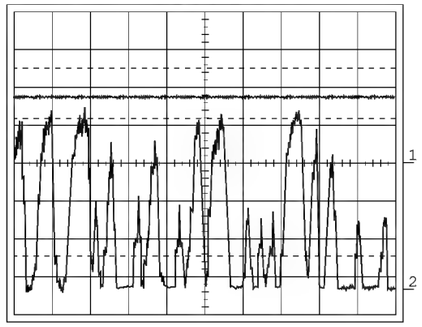
RLLD signal is ouputted at disc halt or occurrence of serious error.



- CH1 : RFIN(DIC1-50, RF Input signal)
- CH2 : RLLD (DIC1-38, RLLD at disc halt or occurrence of serious error)

Fig. 7-27

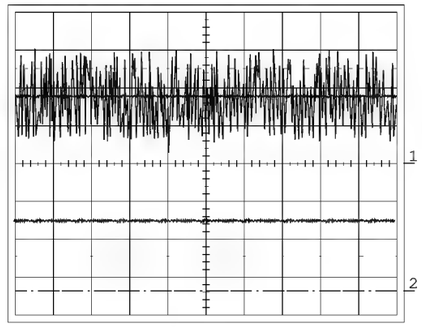
Because RF signal, external VCO input voltage and VCO control voltage swings terribly at disc halt, PLL ouput clock changes largely.(PLL not unlock state)



- CH1 : RFIN(DIC1-50, RF Input signal at disc halt)
- CH2 : VCO control signal (DD1-3, Variable capacitance diode)

Fig. 7-28

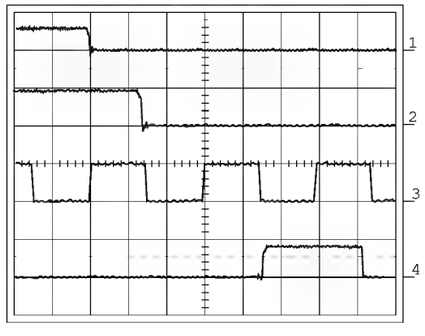
The input voltage of VCO becomes a regular voltage level(approx. 3.59V in Figure) at DVD playback and VCO outputs PLL clock depending on this control voltage. The input voltage of VCO swings a little and appears as frequency variation of VCO as much as change amount. As the control voltage of VCO is higher, PLL clock frequency becomes high.



- CH1 : RFIN(DIC1-50, RF Input signal at disc playback)
- CH2 : VCO control signal (DD1-3, Variable capacitance diode)

Fig. 7-29

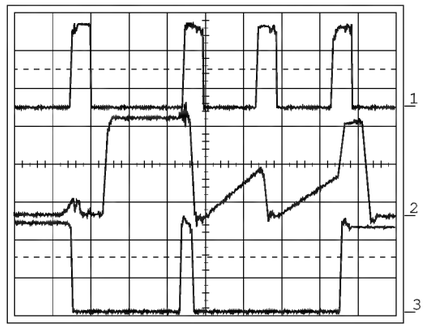
After the error-correcting process of input RF signal in DIC1 it makes the acknowlegde signal of CH2 LOW and outputs data (CH4).
when MPEG decoder(Video, Audio signal process chip) falls the request signal to 0(LOW) and demands data. The data acknowledge signal of CH2 and data of CH4 are synchronized with BSTCLK(CH3) and outputted. BSTCLK of CH3 is made by division of 33MHz into 16.



- CH1 : PVSREQ (DIC1-96, Data request signal from DVD1)
- CH2 : PVSACK (DIC1-93, Output data acknowledge signal)
- CH3 : BSTCLK (DIC1-94, Output clock)
- CH4 : PVSIN (DIC1-81~84,87~90, Output data)

Fig. 7-30

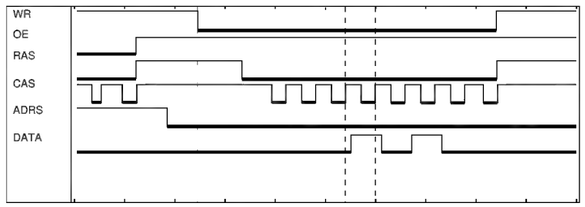
DIC1 shares the data bus of micom with other devices(A/V Decoder, EPROM, SRAM). CH2 shows the measurement of a signal line of data bus. The inclining and rising part in CH2 indicates high impedence state after data bus floating.The data bus is pulled up by 4.7K resistance.



- CH1 : ALE (MIC4-11, Address latch enable signal)
- CH2 : HAD0-7 (MIC4-2 to 9, Main micom address and data multiplexed bus)
- CH3 : HA0-7 (MIC4-19 to 12, Main micom addreess 0-7)

Fig. 7-31

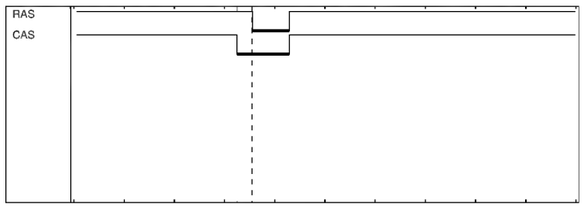
It shows access in fast page mode as waveform when DIC1 accesses external memory(4Mbit DRAM) at DVD refresh.



- WE : Write enable(DIC2-7)
- OE : OUTPUT ENABLE (DIC2-22)
- RAS : RAW ADDRESS STROBE (DIC2-8)
- CAS : COLUMN ADDRESS STROBE (DIC2-23)
- ADRS : ADDRESS
- DATA : DATA

Fig. 7-32

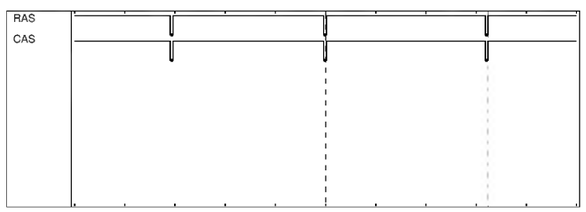
It shows the external memory refresh of DIC1 and uses CAS Before RAS Refresh.



- DIC2 (4MDRAM) REFRESH TIME

Fig. 7-33

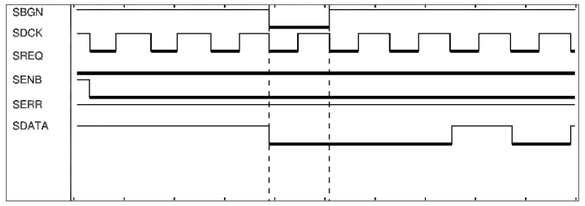
It shows refresh per approx. 31 usec as measurement of refresh waverform outputted by DIC1 in large timing.



Refresh time(Period) of DIC2(4MDRAM)

Fig. 7-34

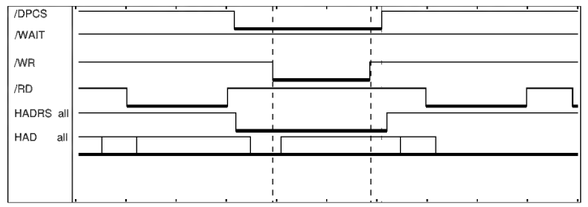
It measures the timing that data processed in DIC1 at DVD playback enters MUX(BIC8, BIC9)



- CH1 : SBGN (DICI-92, SECTOR BEGIN)
- CH2 : SDCK (DICI-94, CLOCK)
- CH3 : SREQ (DICI-96, DATA REQUEST)
- CH4 : SERR (DICI-91, DATA ERROR)
- CH5 : SDATA (DICI-81~84, 87~90, DATA)

Fig. 7-35

It shows the timing of control signal, address and data bus when micom accesses DIC1.
So to speak, timing at writing a value in the internal register of DIC1.



- CH1 : DPCS (DIC1-12, TC90A19F chip select)
- CH3 : WR (DIC1-10, TC90A19F register write)
- CH4 : RD (DIC1-11, TC90A19F register read)
- CH5 : HADRS (DIC1-24,25, Micom address bus)
- CH6 : HAD (DIC1-13~20, Micom data bus)

Fig. 7-36

It shows a waveform that DIC1 requests a management to micom by interrupt generation.
Micom recognizes the interrupt and writes a value in register of DIC1 to respond (instruction) for interrupt. Micom accesses DIC1 five times in Figure. Micom recognizes the operation of chip and makes a necessary instruction after receiving the interrupt generated in DIC1 and accessing the corresponding chip.

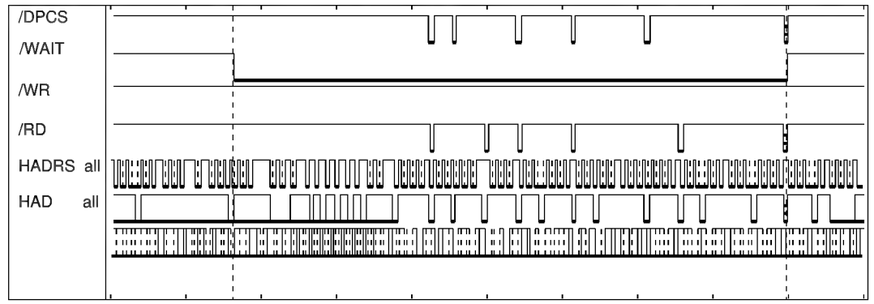


Fig. 7-37

- CH1 : DPCS (DIC1-12, TC90A19F chip select)
- CH2 : DPINT (DIC1-23, TC90A19F interrupt output)
- CH3 : WR (DIC1-10, TC90A19F register write)
- CH4 : RD (DIC1-11, TC90A19Fregister read)
- CH5 : HADRS (DIC1-24,25, Micom address bus)
- CH6 : HAD (DIC1-13~20, Micom data bus)

7-5 VIDEO

7-5-1 Outline

VIC1 does RGB encoding, copy guard processing and D/A conversion of 8bit video data inputted from BIC1 (A/V decoder) by control of MIC1(Micom).
Video signal converted into analog signal is outputted via low pass filter, amplifier and buffer unit of rear unit analog part.
Output signals are Y/Cr/Cb(or RGB), Y/C, composite video and because the processig course of each signal is same, the explanation is made on the basis of composite video signal.

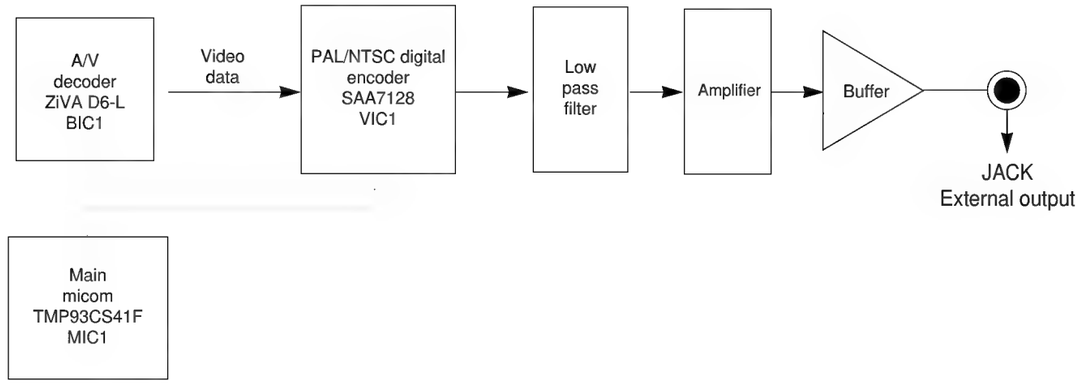


Fig. 7-38 Video output block diagram

7-5-2 NTSC/PAL digital encoder (VIC1;SAA7128)

HSYNC and VSYNC outputted from VIC1 are the synchronous signals with the video signal and control the output timing of 8bit digital video signal (VDATA[7:0]) of ITU-R656 format.
When the ITU-R656 format muxed with Cr/Cb/Y signal is inputted, first demuxing is performed to release the format. The demuxed signal obtains each Y/Cr/Cb, Y, C signal via Luminance processing, Chroma processing. At that time, a signal transformation and addition are made for copy guard processing and obstruct the normal signal copy. The composite signal is formed by adding of luminance and chrominance signal among them and Y/Cr/Cb signal is encoded to RGB by control of micom. RGB output is for the SCART output in Europe.
The above signals, that is Y/Cr/Cb (or RGB) Y/C, composite video signals are outputted from VIC1 through D/A converter.

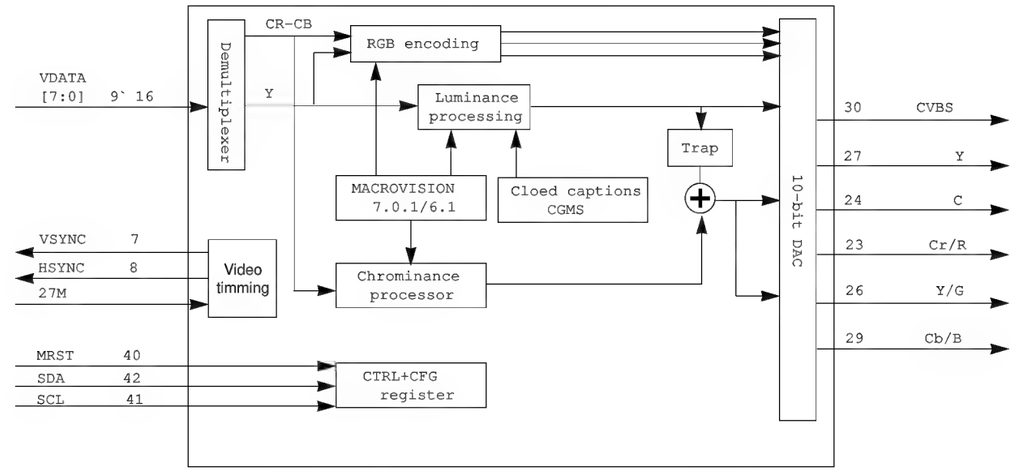


Fig. 7-39 VIC1 (SAA7128) Internal block diagram

7-5-3. Low pass filter VF1, VF2

VF1 and VF2 remove quantization noise occurring in the course of D/A conversion as low pass filter with cut-off frequency of 6.75MHz. VR5 and VR6 are input impedances and convert the level of subcarrier.

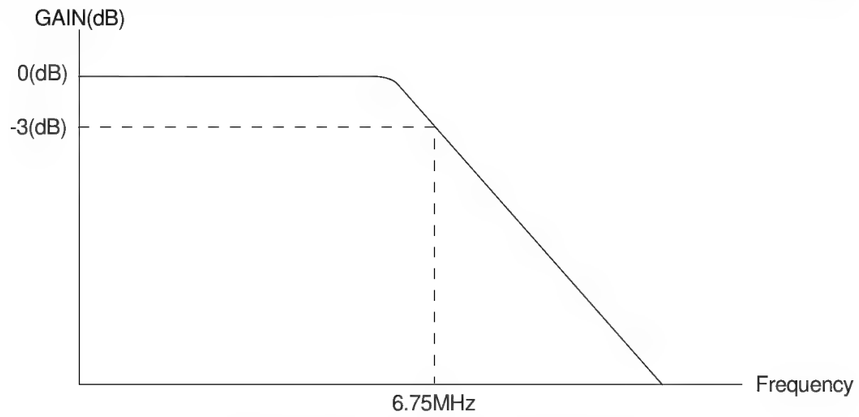


Fig. 7-40 Frequency features of VF1,VF2

7-5-4 Amplifier

VQ1 is buffer and the gain is amplified through VQ2, VQ3. The main factors which determine the gain are VR10 and VR11, and the gain is 1+VR11/VR10. VR12 is the main factor that determines the offset of output signal of amplifier unit and the rate is approx. VR 12/(VR10+VR11)

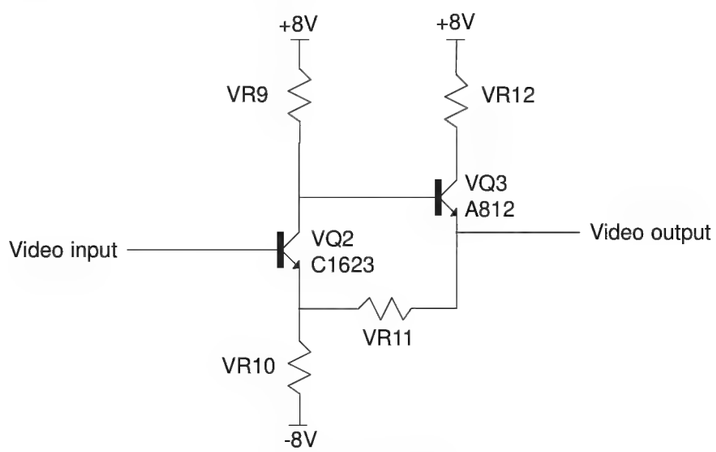


Fig. 7-41 Amplifier

7-6-5 Buffer

VQ4, VQ5, and VQ6 are buffer unit and circuit that double the drive power so as to output without signal conversion when connected with exterior devices. VC11 is an AC coupling capacitor, VR19 is an essential impediance at video signal interface and being matched with the impediance in the input block of exterior devices determines the level of video signal.

7-6 SERVO

7-6-1 Outline

SERVO system of DVD is divided into Focusing SERVO, Tracking SERVO, SLED Linked SERVO and CLV SERVO(DISC Motor Control SERVO).

1. Focusing SERVO
   Focuses the optical spot output from object lens onto the disc surface. Maintains a uniform distance between object lens of Pick-up and disc (for surface vibration of disc).

2. Tracking SERVO
   Make the object lens follow the disc track in use of tracking error signal (created from Pick-up).

3. SLED Linked SERVO
   When the tracking actuator inclines outwardly as the object lens follows the track during play, the SLED motor moves slightly (and counteracts the incline).

4. CLV SERVO (DISC Motor Control SERVO)
   Controls the disc motor to maintain a constant linear velocity (necessary for RF signal).

7-6-2 Block diagram

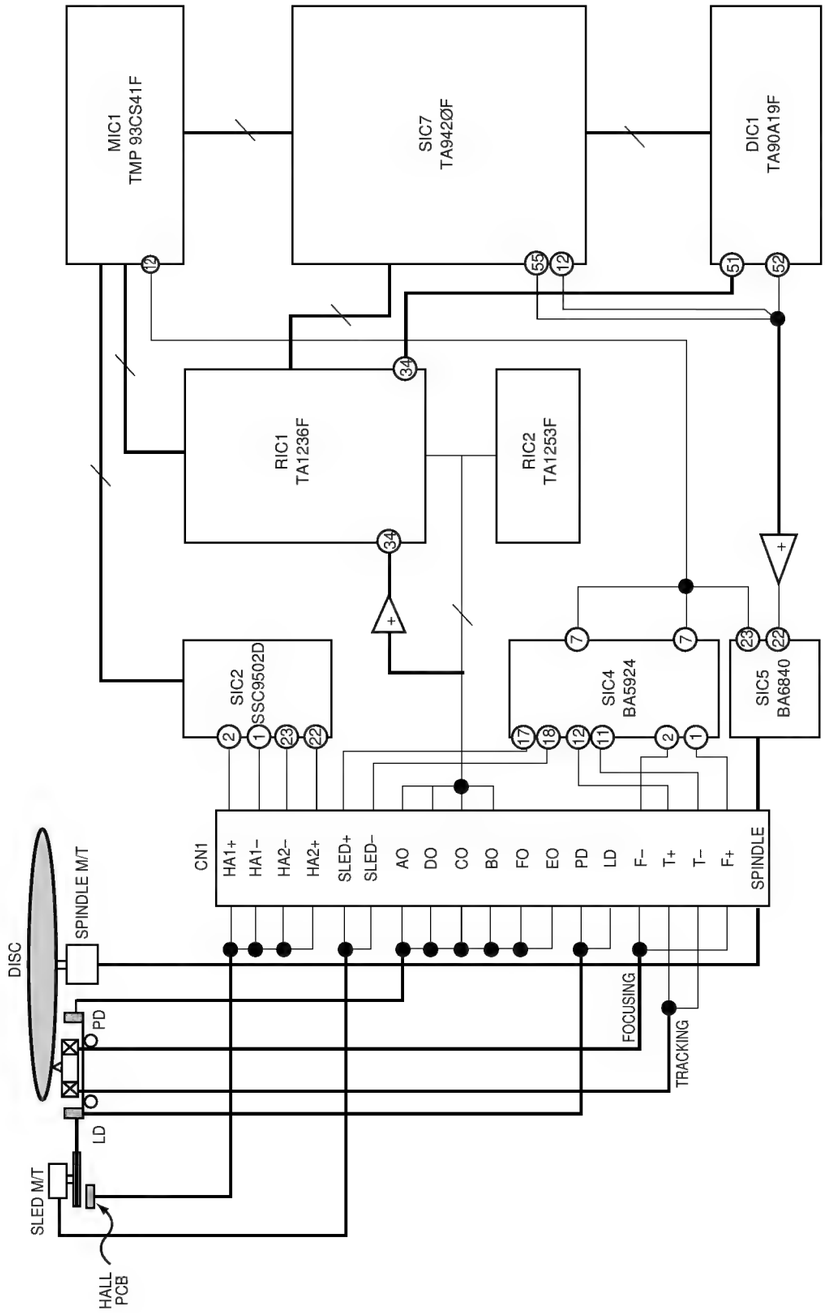


Fig. 7-42

7-6-3 Operation

1) FOCUSING SERVO

(1). FOCUS INPUT

The focus loop is changed from open loop to closed loop, and the triangular waveform moves the object lens up and down (at pin 48 of SIC7 during Focus SERVO ON.) At that time, S curve is input to pin 43 of SIC7.

SBAD (pin 44 of SIC7) signal, summing signal of PD 1, B, C, D, is generated, and zero cross(2.1V) point occurs when S curve is focused and SBAD signal exceeds a preset,constant value. The focus loop is changed to closed loop, and the object lens follows the disc movement, maintaining a constant distance from the disc. (these operations are same in CD and DVD).

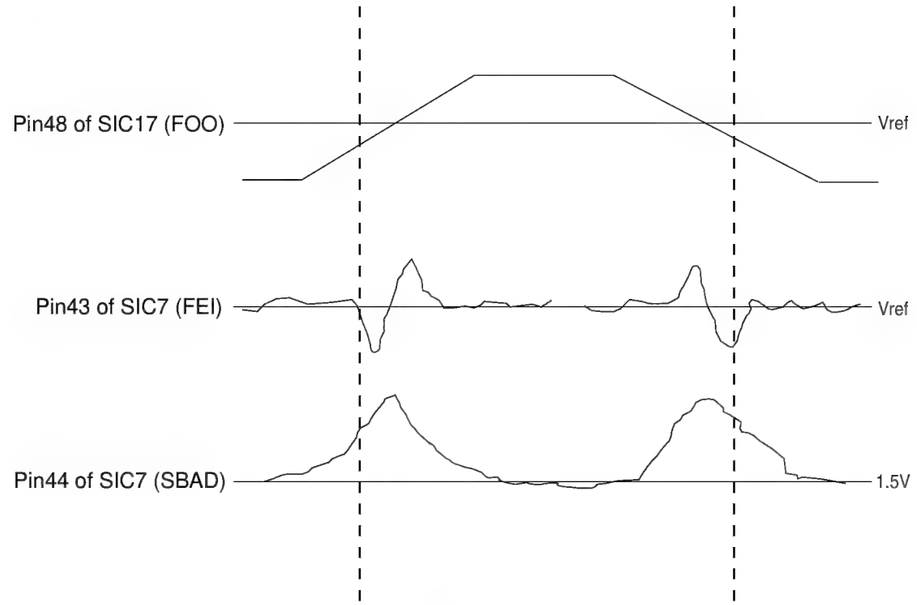


Fig. 7-43

(2). PLAY

When focus loop closes the loop during focus servo on, both pin 43 and pin 48 of SIC7 are controlled by VREF voltage(approx. 2.1V), and pin 1, 2 of SIC4 are approximately 4.5V.

2) TRACKING SERVO

(1). NORMAL PLAY MODE

(1) For DVD

Composite : The signal output from PD A, B, C, D of Pick-up, the tracking error signal (RIC2 pin 14) uses the phase difference of A+C and B+D in RIC2, and inputs to terminal 8 of RIC1. The signal is output to RIC1 pin 21, and input to SIC7 pin46(TEI). Then, it is output to SIC7 pin 49 via digital equalizer, and applied to the tracking actuator through SIC4. Pins 46, 49 of SIC7 are controlled by VREF(approx. 2.1V) during normal play. Meanwhile, DVD repeats the track jump from 1 to 4 in inner direction at normal play (because data- read speed from disc is faster than data output speed on screen).

(2) For CD, VCD
Receive the signal output through E, F of Pick-up, from RIC1, differently from DVD and make the tracking error signal through RIC1 pin21. The tracking error signal is similar to DVD.

• SEARCH Mode :

Search mode : Fine seek,(Moving the tracking actuator slightly little below 255 track) and coarse search, moving much in use of sled motor. The coarse search will be described in sled linked servo and now, the fine seek is explained shortly.
If the object lens is located near target, cut off the tracking loop and give the control signal as many as desired count to move the tracking actuator via SIC7 pin 49 terminal(TRO).

3) SLED LINKED SERVO

• Normal play mode

Move SLED motor slightly by means of PWM signal in SIC7 pin 54, as the tracking actuator moves along with track during play. Control to move the entire Pick-up as the tracking actuator moves.

• Coarse serach mode

In case of long-distance search(such as chapter serach), pin 48 uses sled FG (SIC2 pin 19, which is generated) by rotation of sled motor via hall PCB. Then, read ID and compute the existing track count after input of next track. If the existing track count is within fine seek range, tracking begins using fine seek.

4) CLV SERVO(DISC MOTOR CONTROL SERVO)

• For DVD mode

Input RF signal (from Pick-up) to DIC1 pin50. Detect SYNC signal from RF in DIC1, and output PWM signal to DIC1 pin 54 for constant linear velocity.

• For DC, VCD mode

Input RF signal (from Pick-up) to SIC7 pin 36, Detect SYNC signal from RF in SIC7, and output PWM signal to SIC7 pin 55 for constant linear velocity.

7-7 Audio

7-7-1 Outline

The audio data transmitted from A/V decoder(BIC1:ZiVA D6-L) are converted into analog signal via audio D/A converter and outputted through power filter and amplifier. DVD audio is outputted after division into two cases that only 2 channels(L/R channel) are used and 5.1 channel of AC-3 is used. CD and VCD are outputted with only 2 outputs(L/R channel).
If DVD of 2 channels is used, rear L/R channel, center channel and subwooder channel are mixed and outputted in 2 channels.
The digital signals(IEC-958 Output) outputted from A/V decoder (BIC1:ZiVA D6-L)are outputted to digital amp or AC-3 amp through optical jack(AJ4) and RCA jack(AJ3).

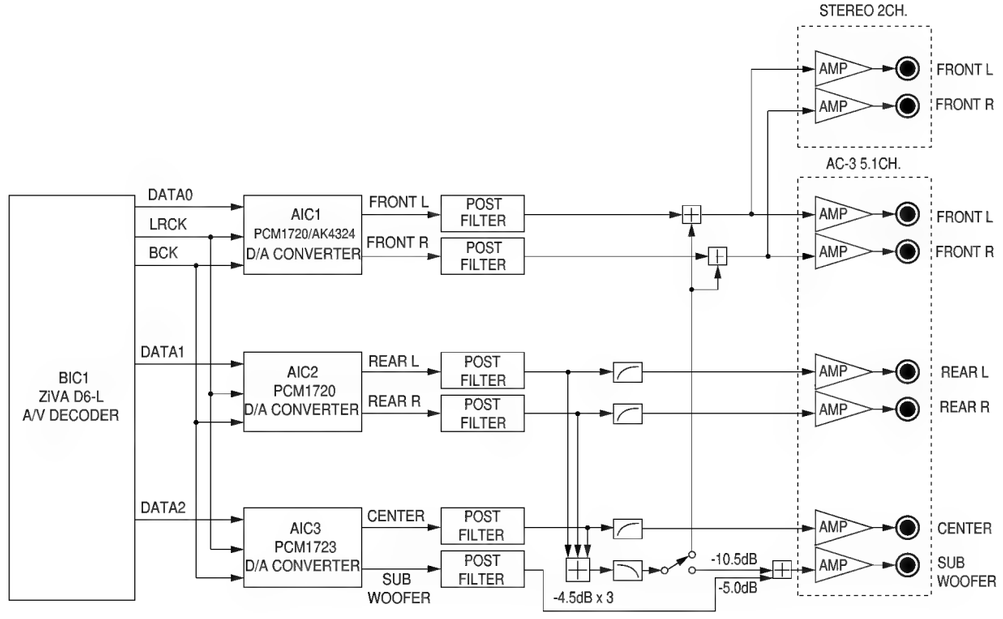


Fig. 7-44 Audio output Diagram

7-7-2 DVD audio output

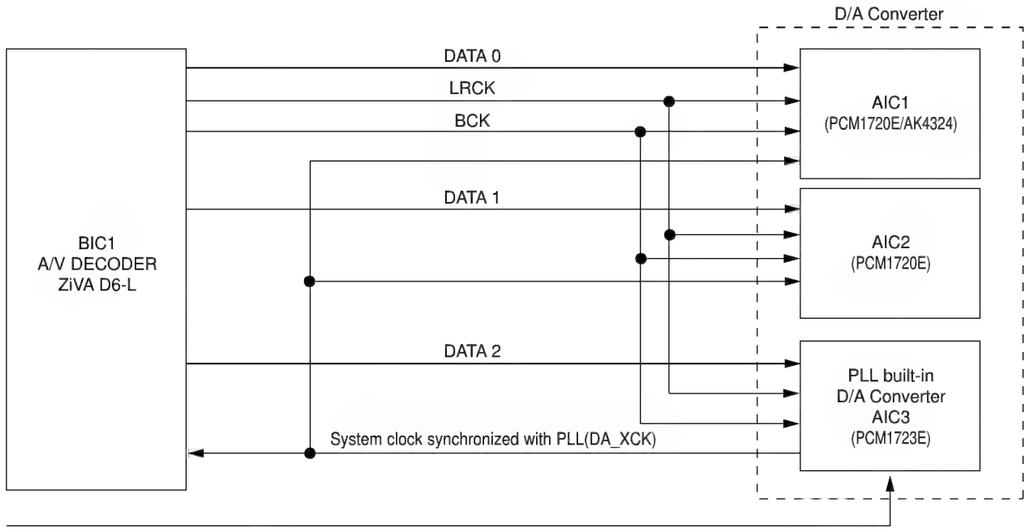


Fig. 7-45 Audio data and CLK

7-7-2(a) AC-3 5.1 channel

The system CLK generated by AIC3 built-in PLL circuit is provided for A/V decoder(BIC1) and audio D/A converter (AIC1, AIC2)and Sync. of each channel is agreed.
DVD audio data outputted from BIC1 A/V decoder are supplied to DATA0 for 2 channels and to DATA0-2 for 5.1 channel. Then, LRCK is outputted by 48KHz or 96KHz.
Front L/R channel is outputted in DATA0, rear L/R channel in DATA1 and center and sub woofer channel in DATA2. DATA0 data are outputted to front L/R channel after D/A conversion and filtering of AIC1(PCM1720/AK4324).
DATA1 data are ouputted by analog signal of D/A converter of AIC2(PCM1720E) and to rear L/R via HPF after filtering.
DATA2 data are converted into analog signal by D/A converter of AIC3(PCM1723E) and one channel is outputted by center output via post filter and HPF.
The other channel of AIC3(PCM1723E) is outputted by subwoofer signal through amplifier of -5.0dB and LPF.

7-7-2(b) Bass redirection(2 Channel down mixing)

If the user do not have sub woofer speaker and the disc is recorded by 5.1 channel, center, rear, sub woofer bass signal can be downmixed in 2 channel front L/R.
If there is a sub woofer speaker, it is outputted directly to subwoofer without down mixing.

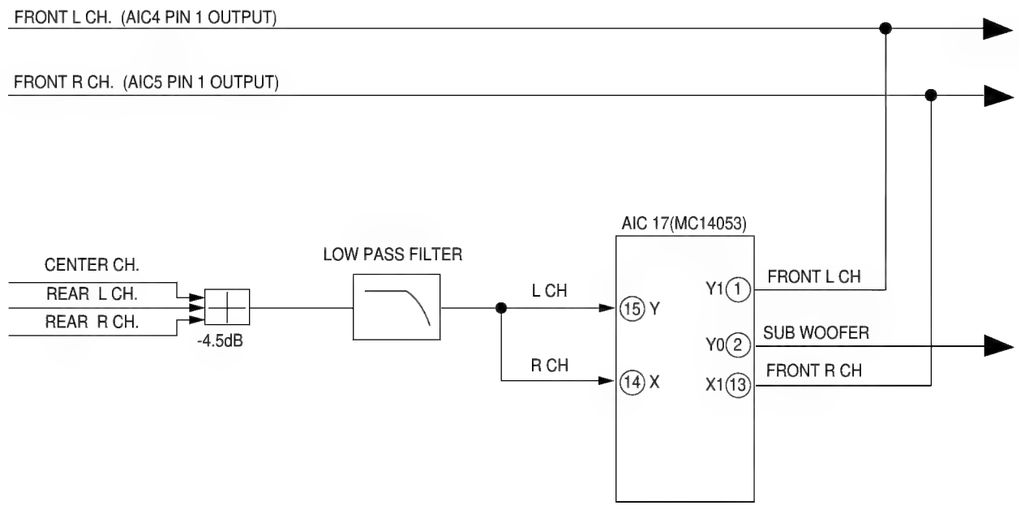


Fig. 7-46 2 Channel down mixing

The switch operations are carried out by AIC17(14053) in case of 2 Channel down mixing and SUB WOOFER speaker using.

	DOWN MIXING	THE USER USES SUB WOOFER
AIC17(10,11PIN) A,B	H	L
OUTPUT	AIC17(PIN 13,1) X1, Y1 MIXED L/R OUPUT	AIC17(PIN 2) Y0 (PIN2 SUB WOOFER OUTPUT)

Table 7-47 Down mixing output table

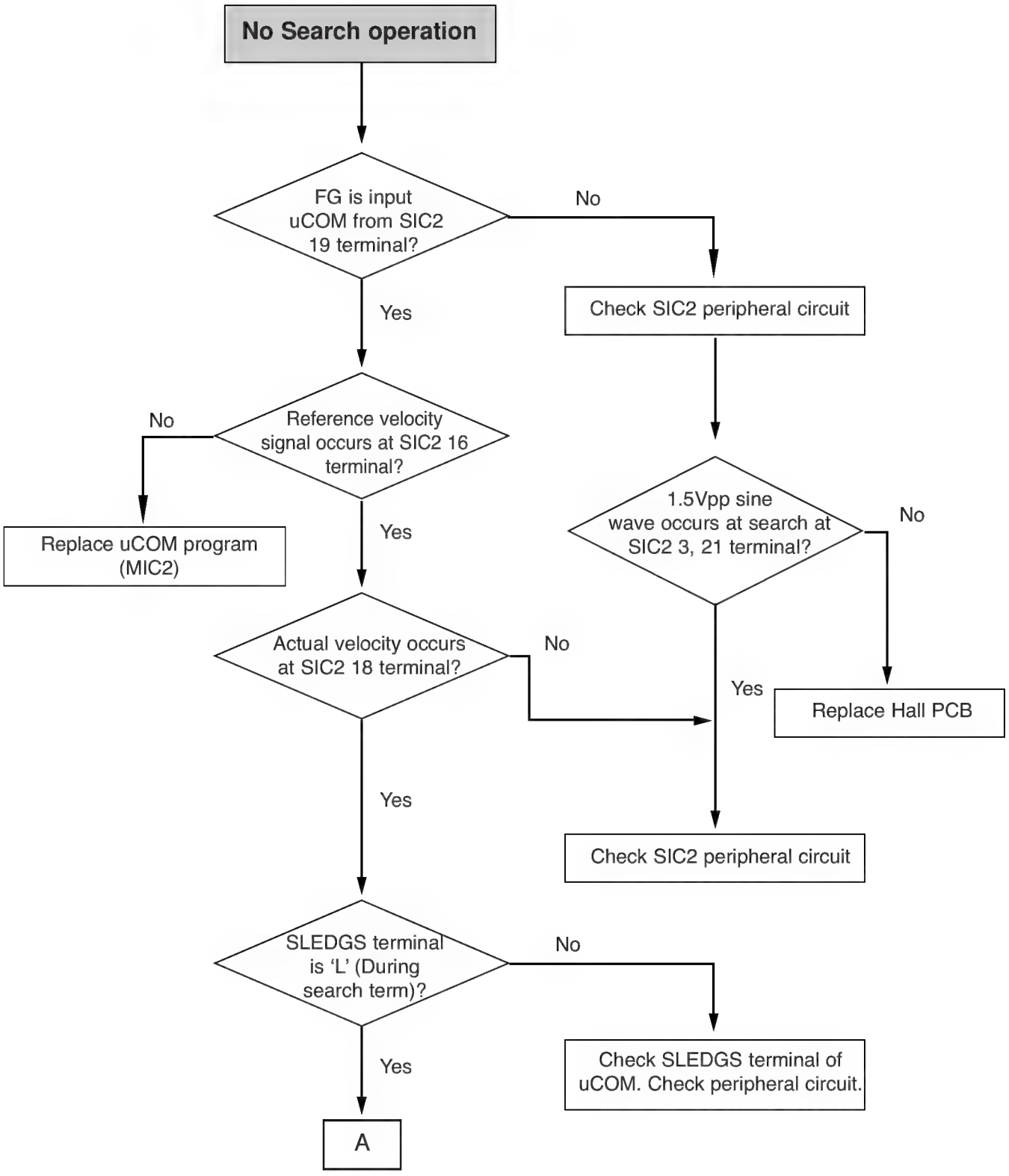
7-7-3 CD/VCD audio output

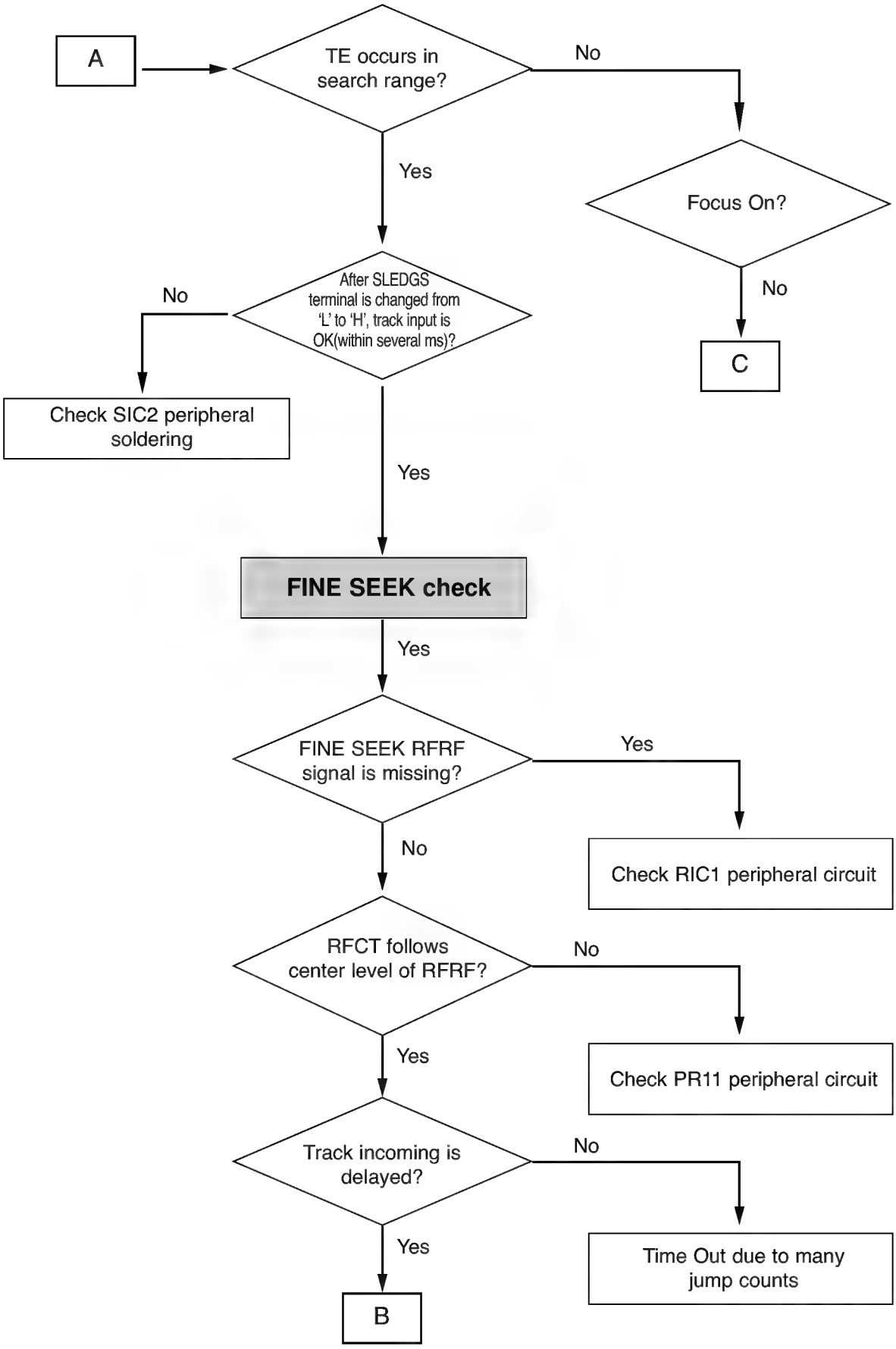
The audio of CD and VIDEO-CD bypasses the signals of SIC7(TC9420F) in BIC8,9 and BIC1 A/V decoder and outputs them to DATA0. Also they are outputted in stereo 2 channel(L/R channel) via D/A conversion and filtering of AIC1(PCM1720/AK4324).

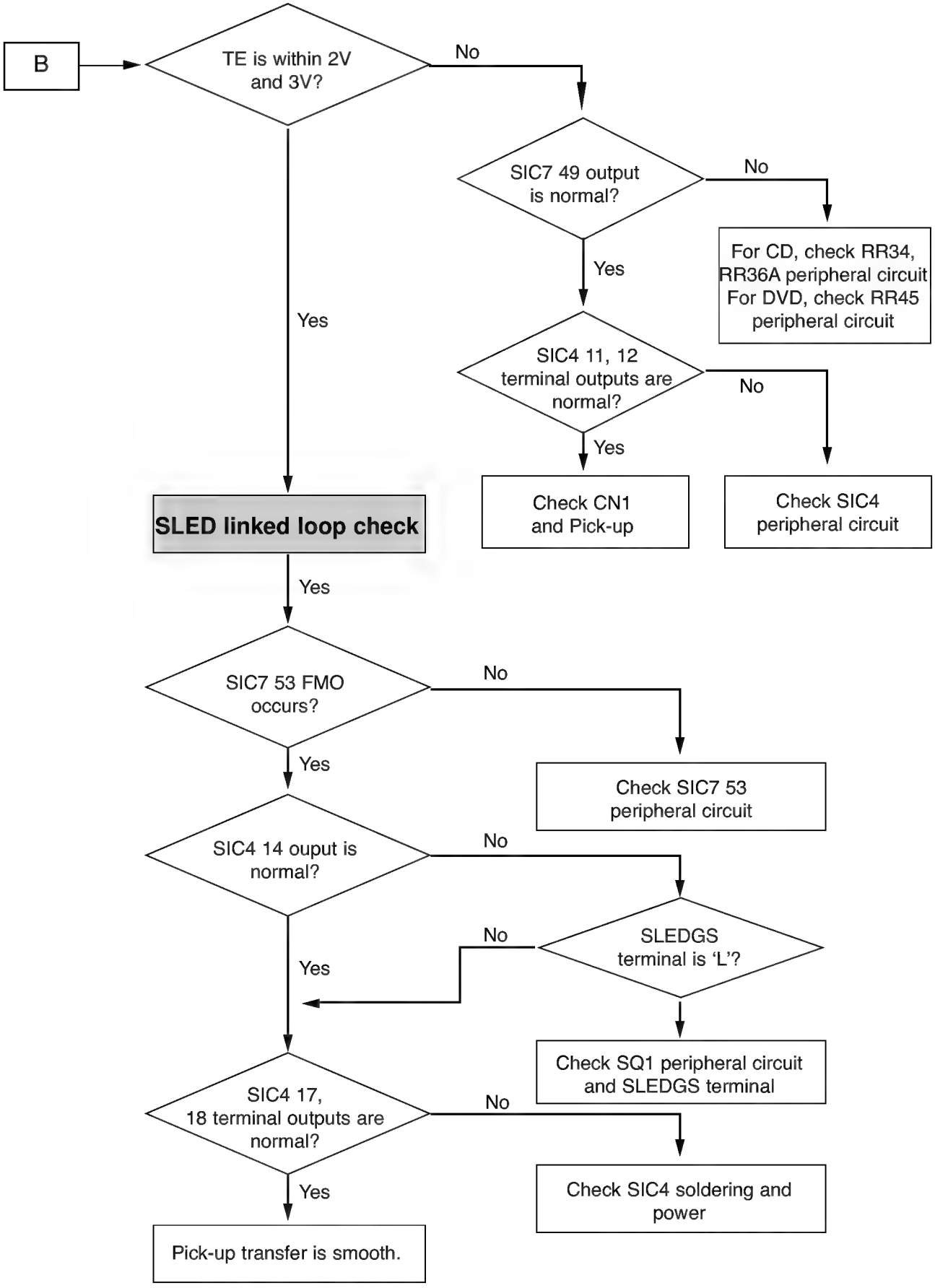
MEMO

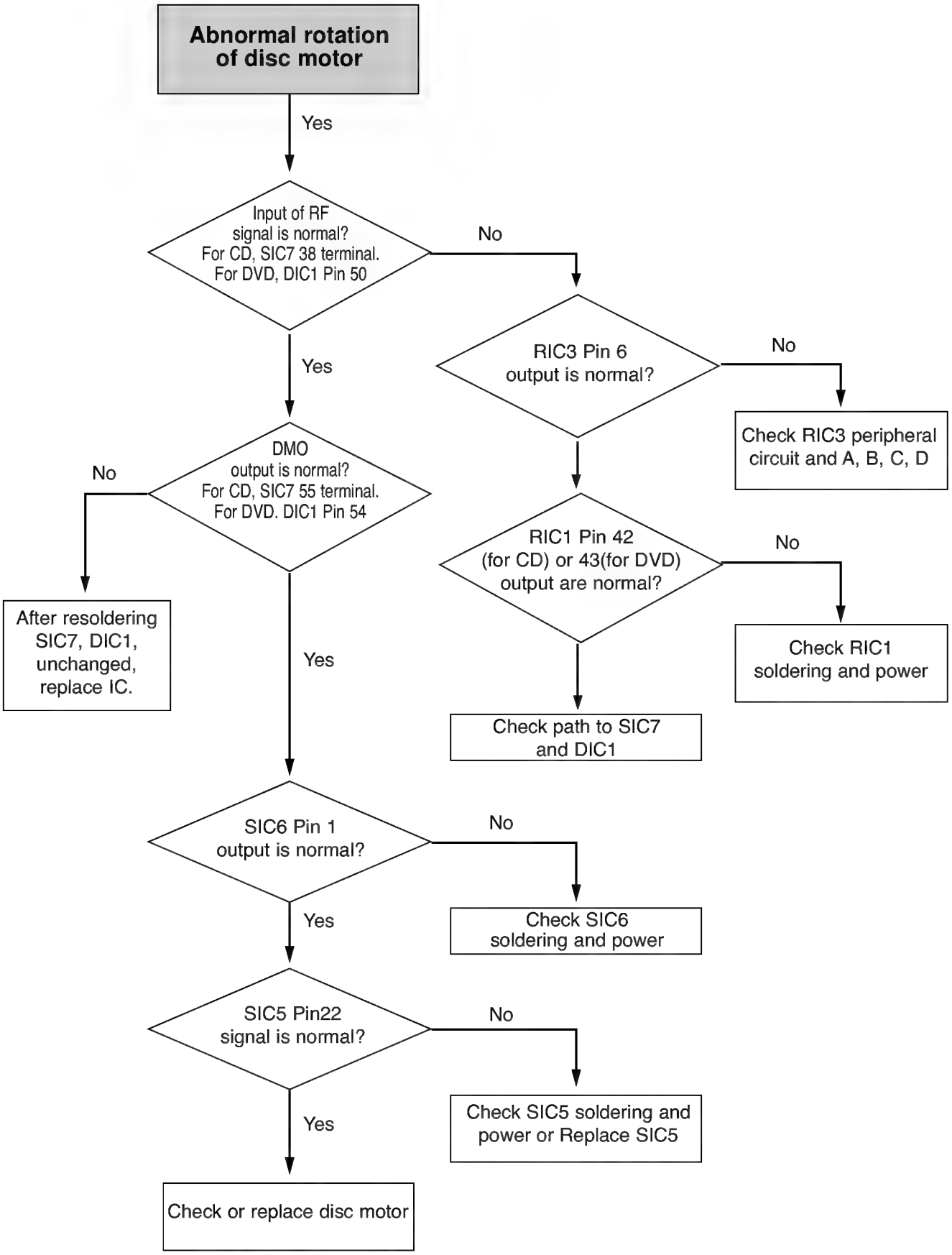
8. Troubleshooting

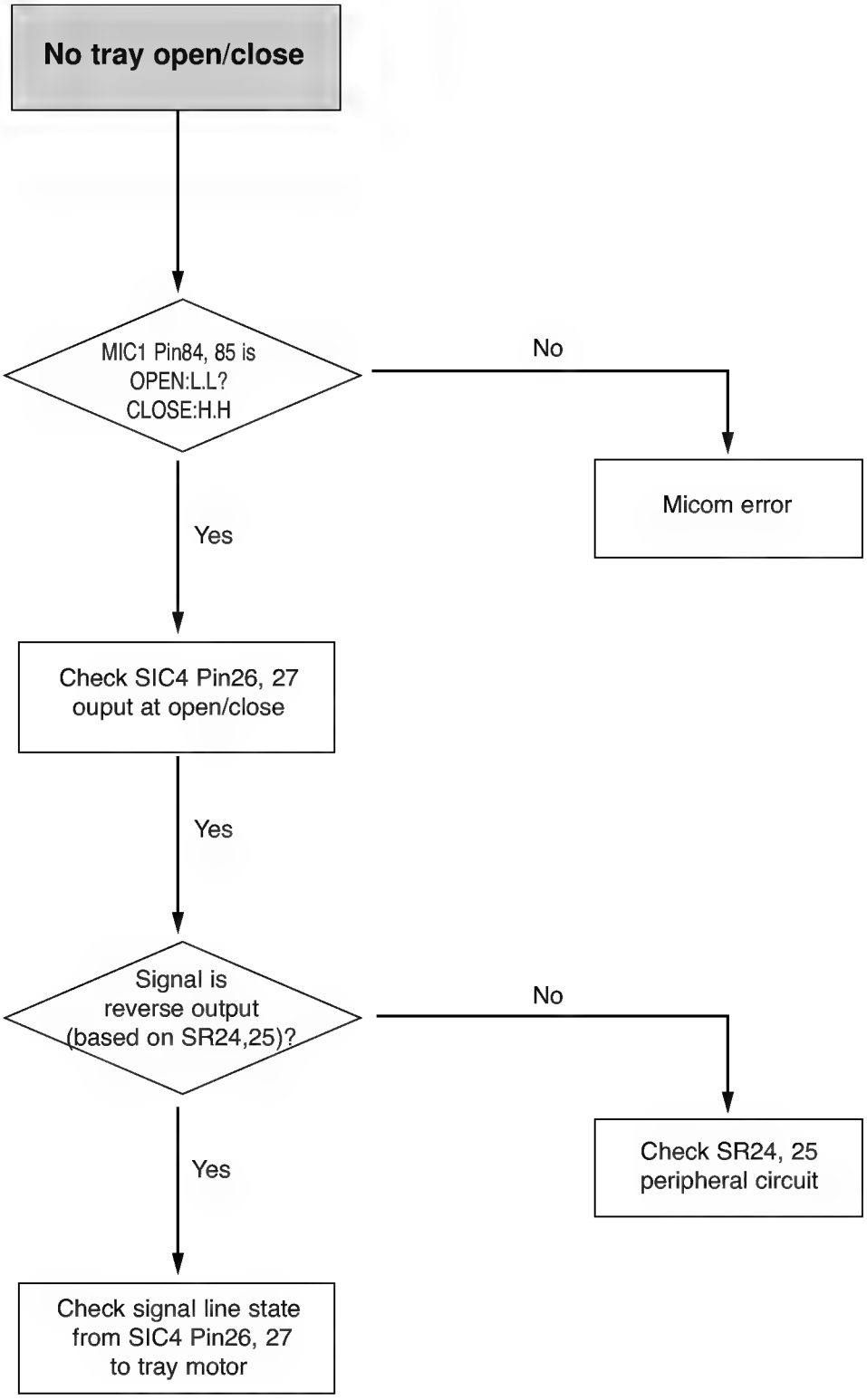
8-1. SERVO Thoubles

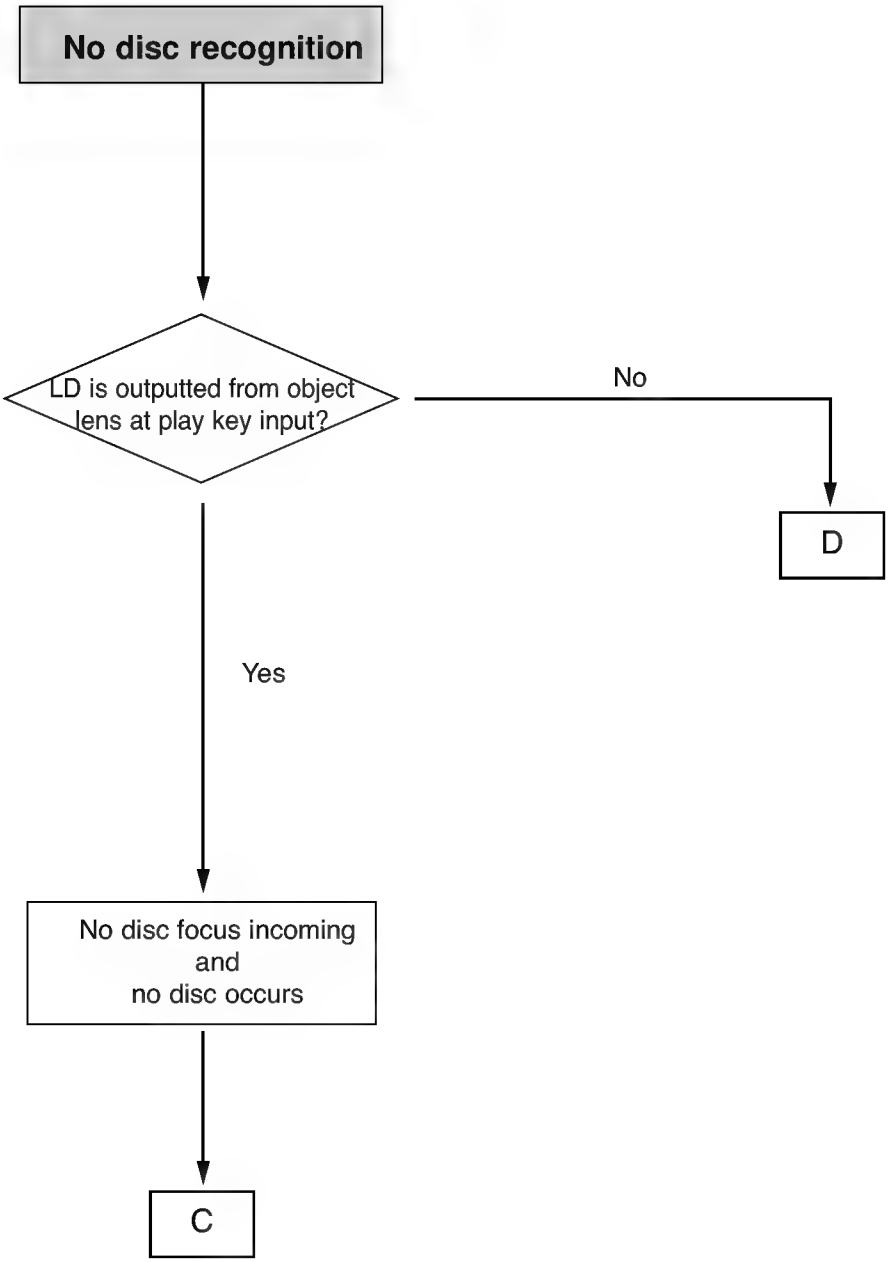


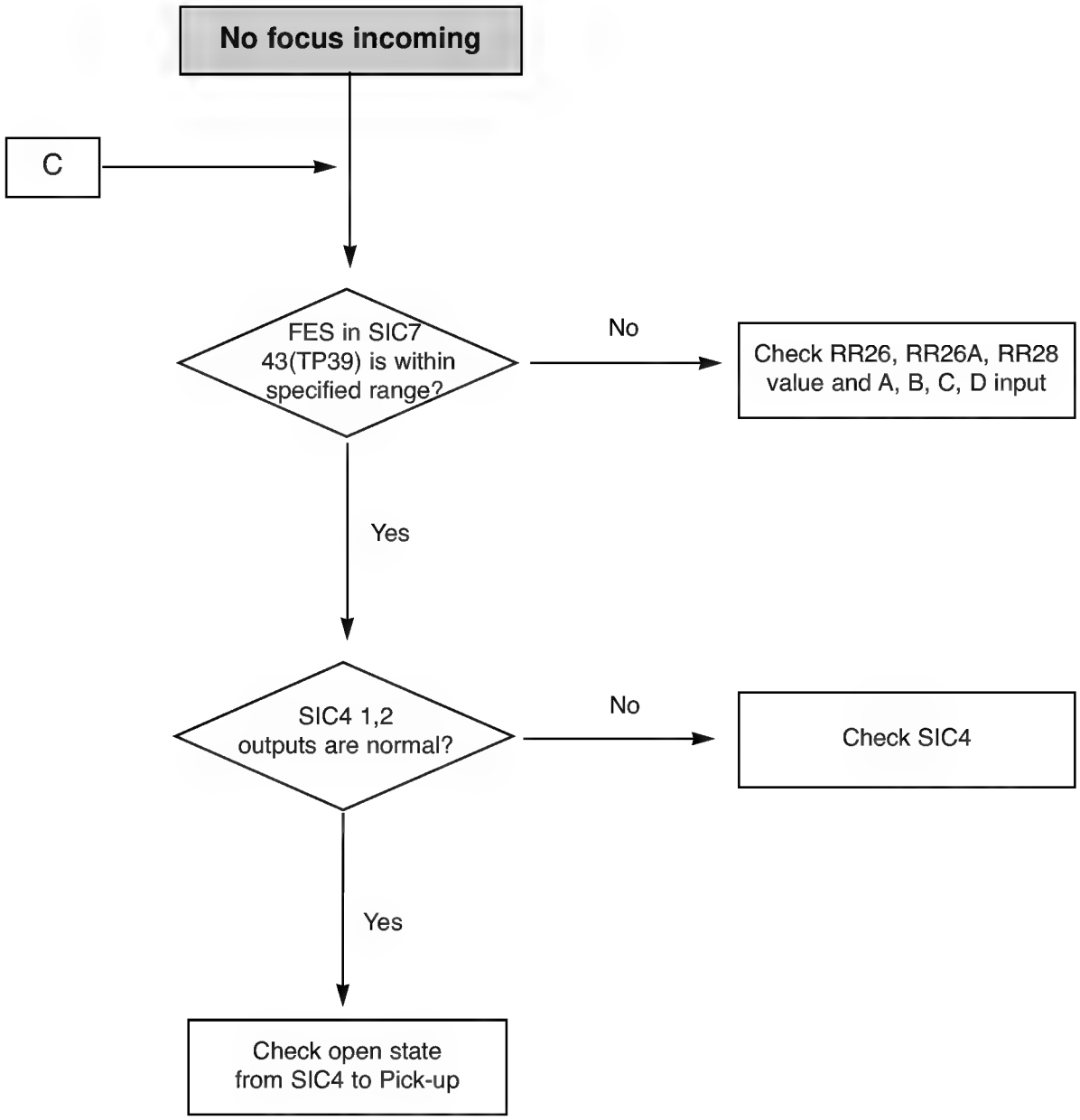

A
TE occurs in search range?
No
Yes
Focus On?
No
C
After SLEDGS terminal is changed from 'L' to 'H', track input is OK(within several ms)?
No
Check SIC2 peripheral soldering
Yes
FINE SEEK check
Yes
FINE SEEK RFRF signal is missing?
Yes
Check RIC1 peripheral circuit
No
RFCT follows center level of RFRF?
No
Check PR11 peripheral circuit
Yes
Track incoming is delayed?
No
Time Out due to many jump counts
Yes
B

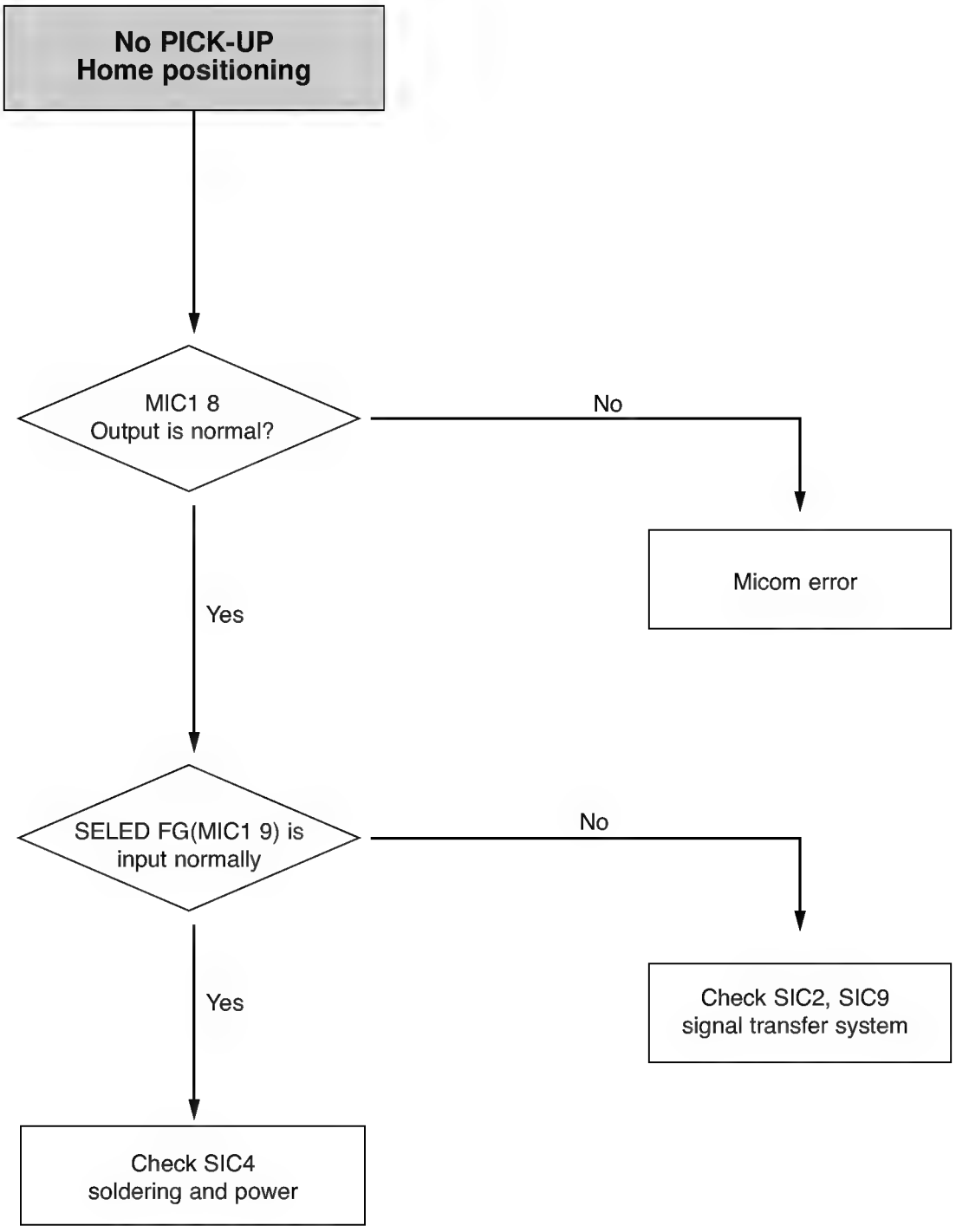

B
TE is within 2V and 3V?
No
Yes
SIC7 49 output is normal?
No
For CD, check RR34, RR36A peripheral circuit For DVD, check RR45 peripheral circuit
Yes
SIC4 11, 12 terminal outputs are normal?
No
Yes
Check CN1 and Pick-up
Check SIC4 peripheral circuit
SLED linked loop check
Yes
SIC7 53 FMO occurs?
No
Check SIC7 53 peripheral circuit
Yes
SIC4 14 ouput is normal?
No
SLEDGS terminal is 'L'?
No
Yes
Check SQ1 peripheral circuit and SLEDGS terminal
SIC4 17, 18 terminal outputs are normal?
No
Check SIC4 soldering and power
Yes
Pick-up transfer is smooth.

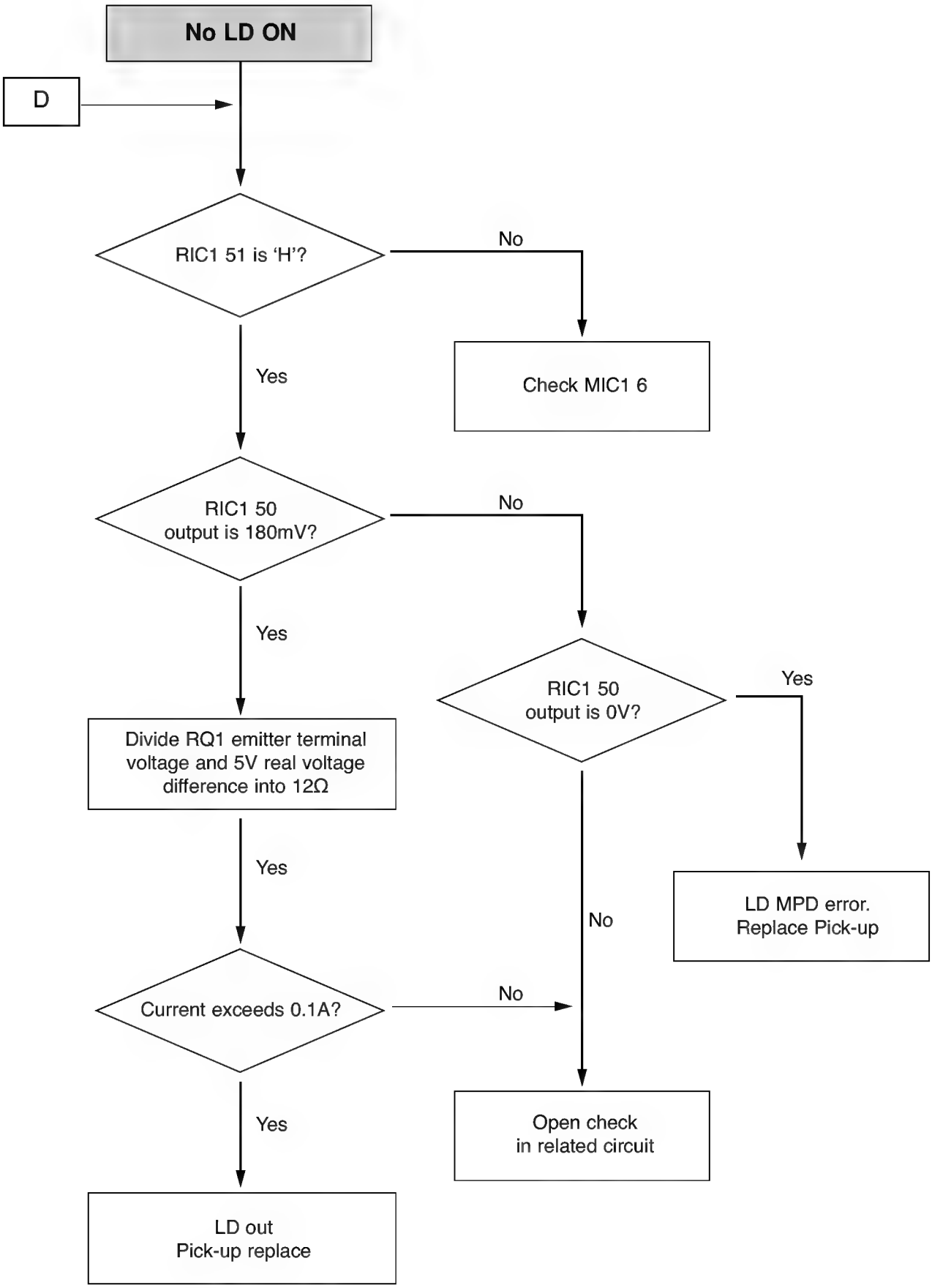

Abnormal rotation of disc motor
Yes
Input of RF signal is normal? For CD, SIC7 38 terminal. For DVD, DIC1 Pin 50
No
RIC3 Pin 6 output is normal?
No
Check RIC3 peripheral circuit and A, B, C, D
Yes
DMO output is normal? For CD, SIC7 55 terminal. For DVD. DIC1 Pin 54
No
After resoldering SIC7, DIC1, unchanged, replace IC.
RIC1 Pin 42 (for CD) or 43(for DVD) output are normal?
No
Check RIC1 soldering and power
Check path to SIC7 and DIC1
Yes
SIC6 Pin 1 output is normal?
No
Check SIC6 soldering and power
Yes
SIC5 Pin22 signal is normal?
No
Check SIC5 soldering and power or Replace SIC5
Yes
Check or replace disc motor

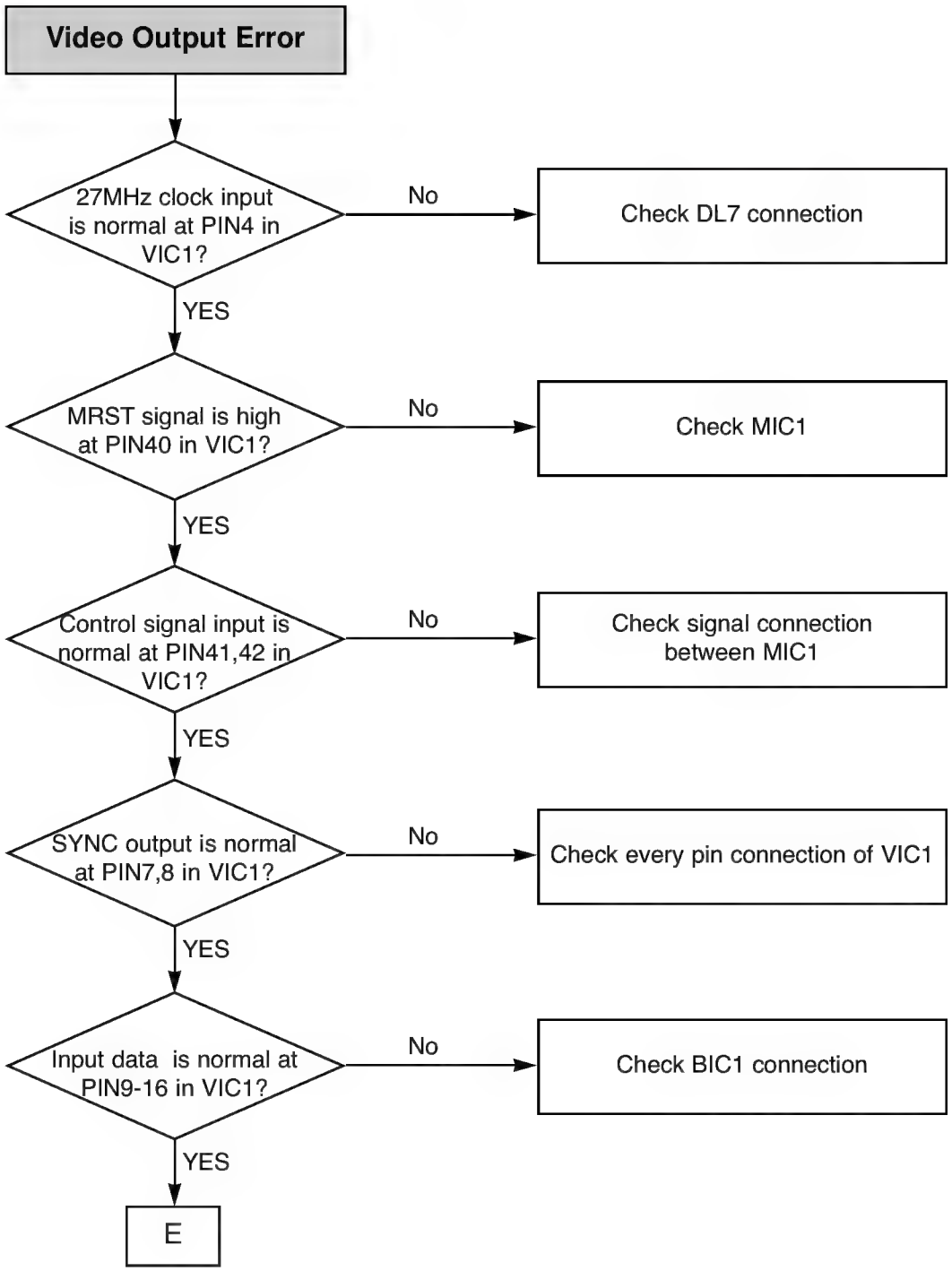

No tray open/close
MIC1 Pin84, 85 is
OPEN:L.L?
CLOSE:H.H
No
Micom error
Yes
Check SIC4 Pin26, 27
ouput at open/close
Yes
Signal is
reverse output
(based on SR24,25)?
No
Check SR24, 25
peripheral circuit
Yes
Check signal line state
from SIC4 Pin26, 27
to tray motor

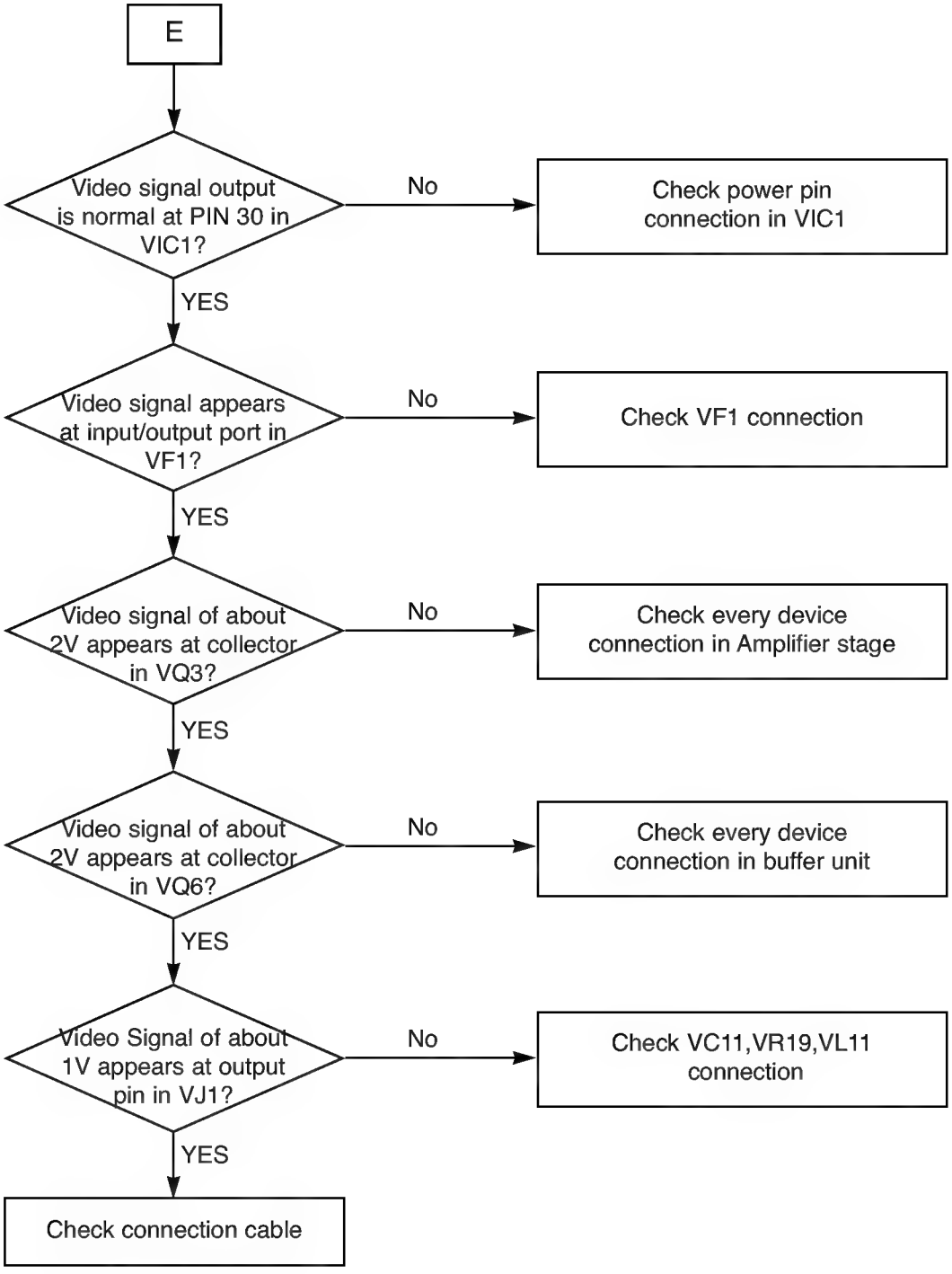

No disc recognition
LD is outputted from object lens at play key input?
No
D
Yes
No disc focus incoming and no disc occurs
C

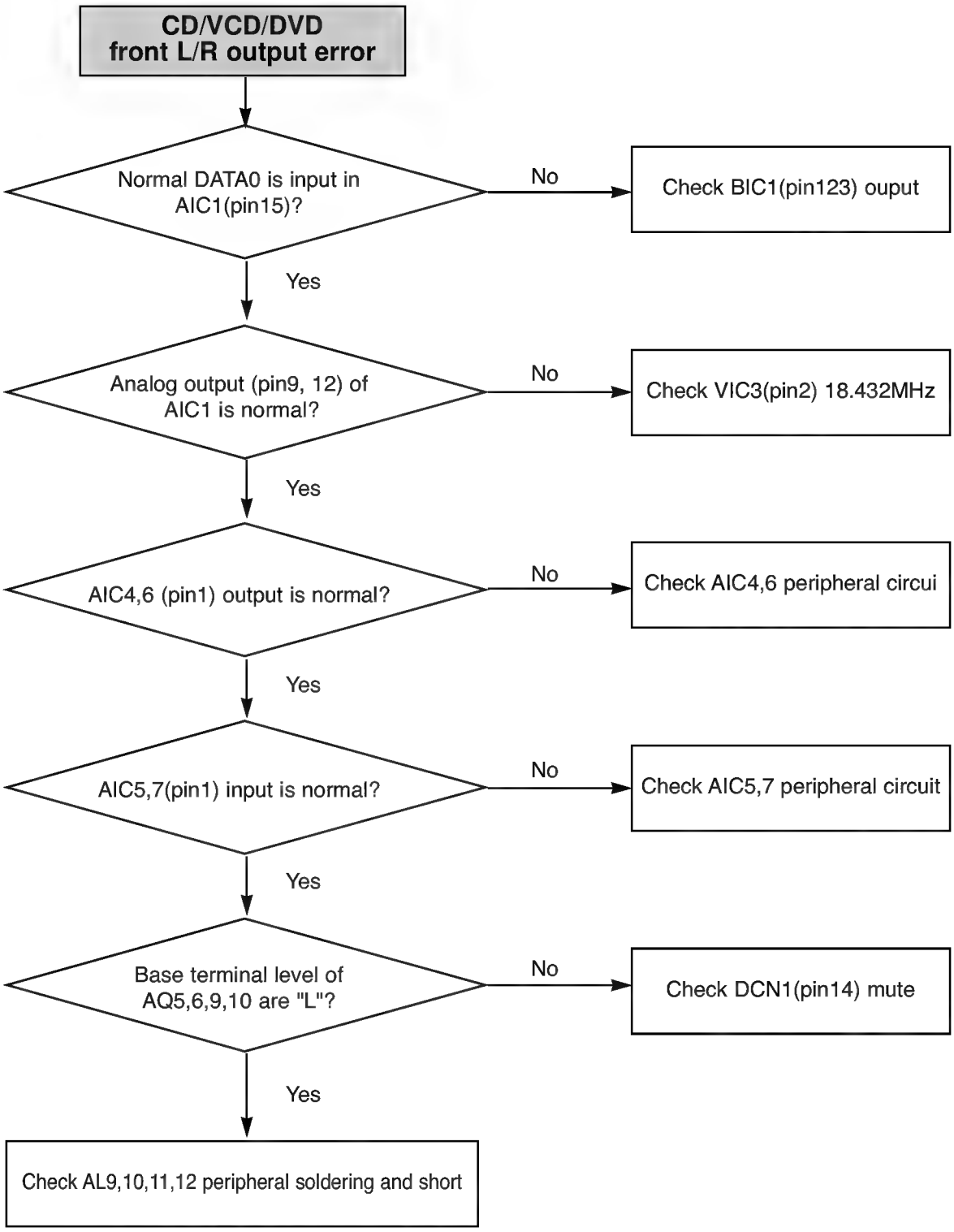

No focus incoming
C
FES in SIC7 43(TP39) is within specified range?
No
Check RR26, RR26A, RR28 value and A, B, C, D input
Yes
SIC4 1,2 outputs are normal?
No
Check SIC4
Yes
Check open state from SIC4 to Pick-up

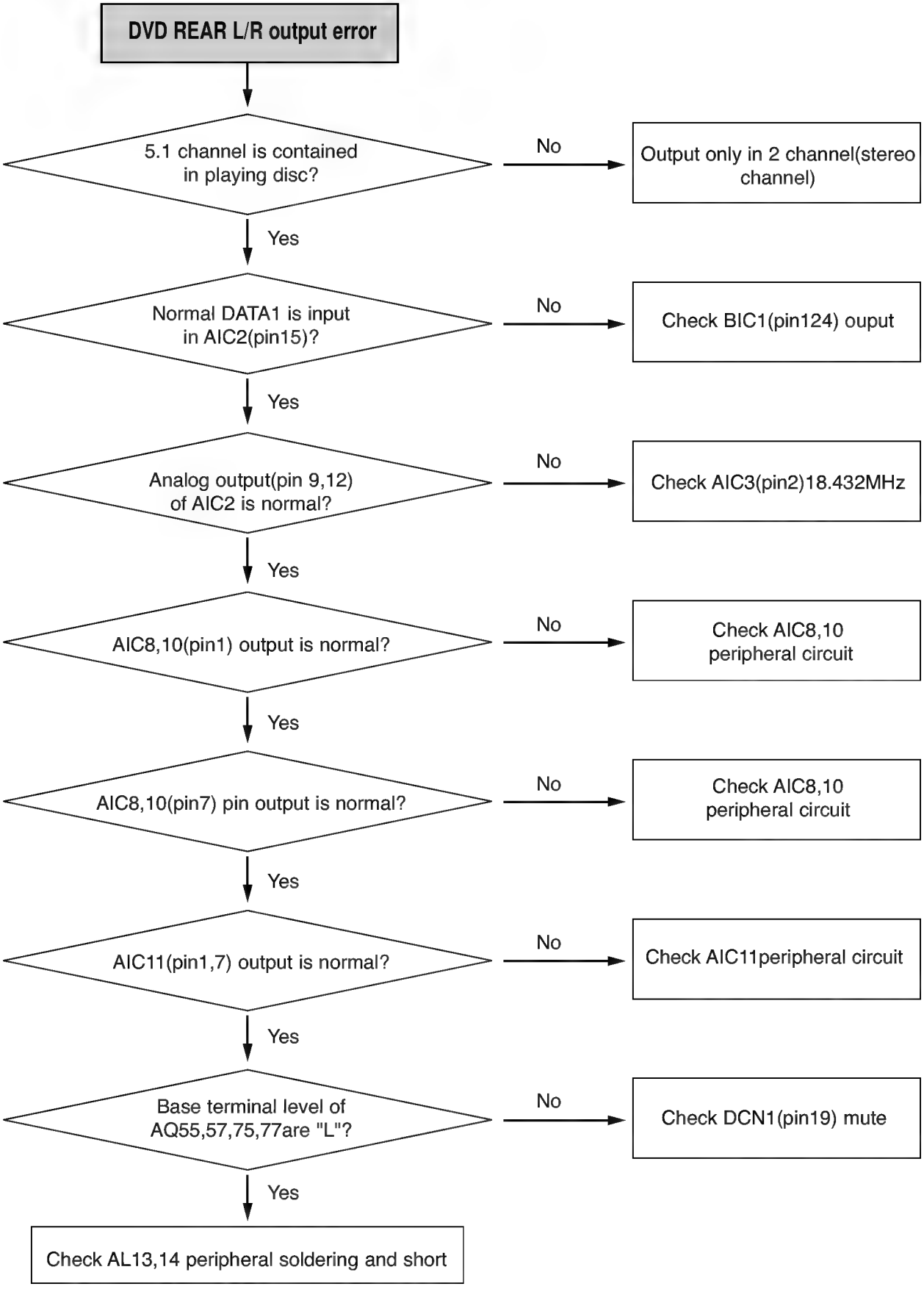

No PICK-UP
Home positioning
MIC1 8
Output is normal?
No
Micom error
Yes
SELED FG(MIC1 9) is
input normally
No
Check SIC2, SIC9
signal transfer system
Yes
Check SIC4
soldering and power

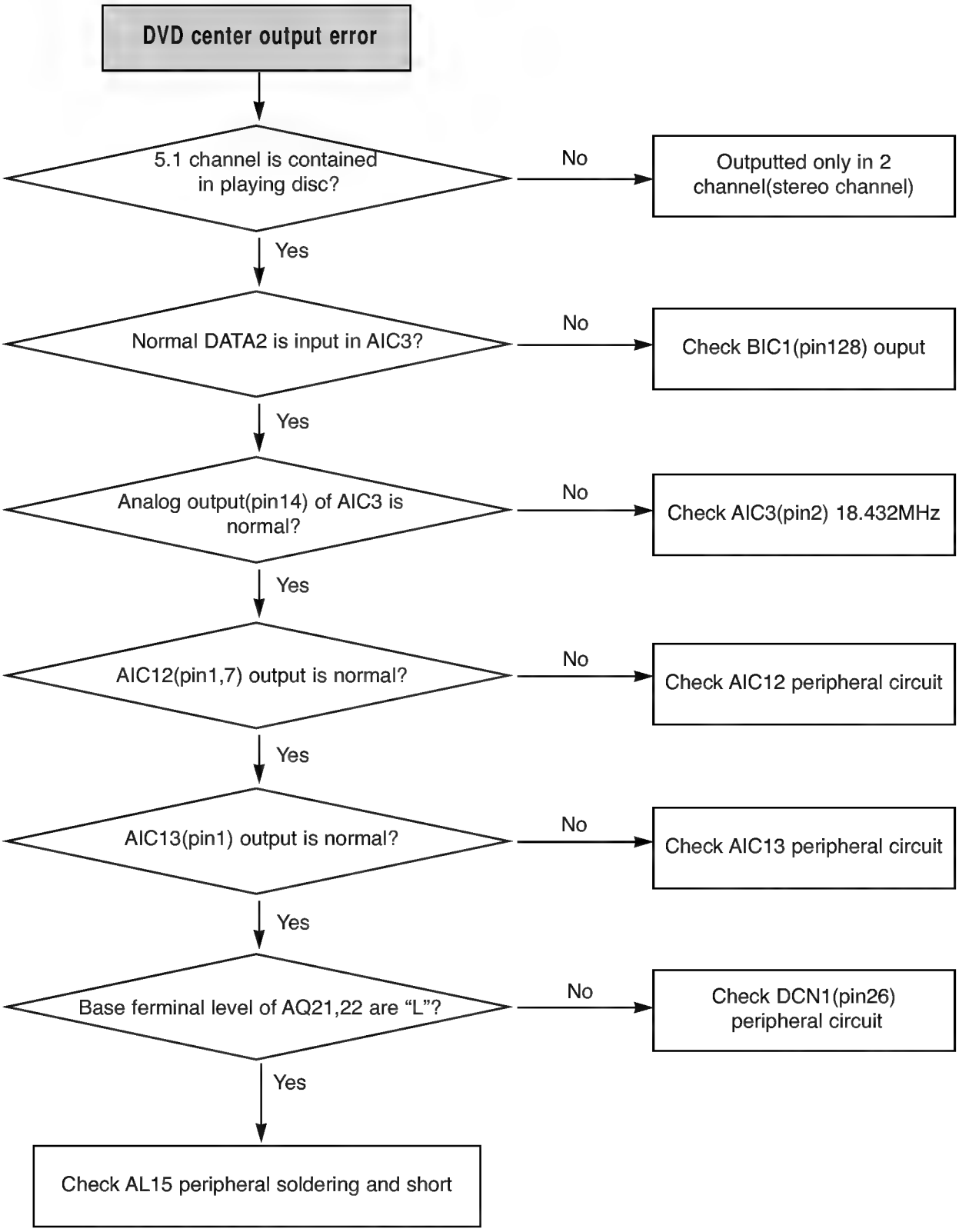

No LD ON
D
RIC1 51 is 'H'?
No
Check MIC1 6
Yes
RIC1 50
output is 180mV?
No
Yes
RIC1 50
output is 0V?
Yes
Divide RQ1 emitter terminal
voltage and 5V real voltage
difference into 12Ω
LD MPD error.
Replace Pick-up
Yes
No
Current exceeds 0.1A?
No
Yes
Open check
in related circuit
LD out
Pick-up replace

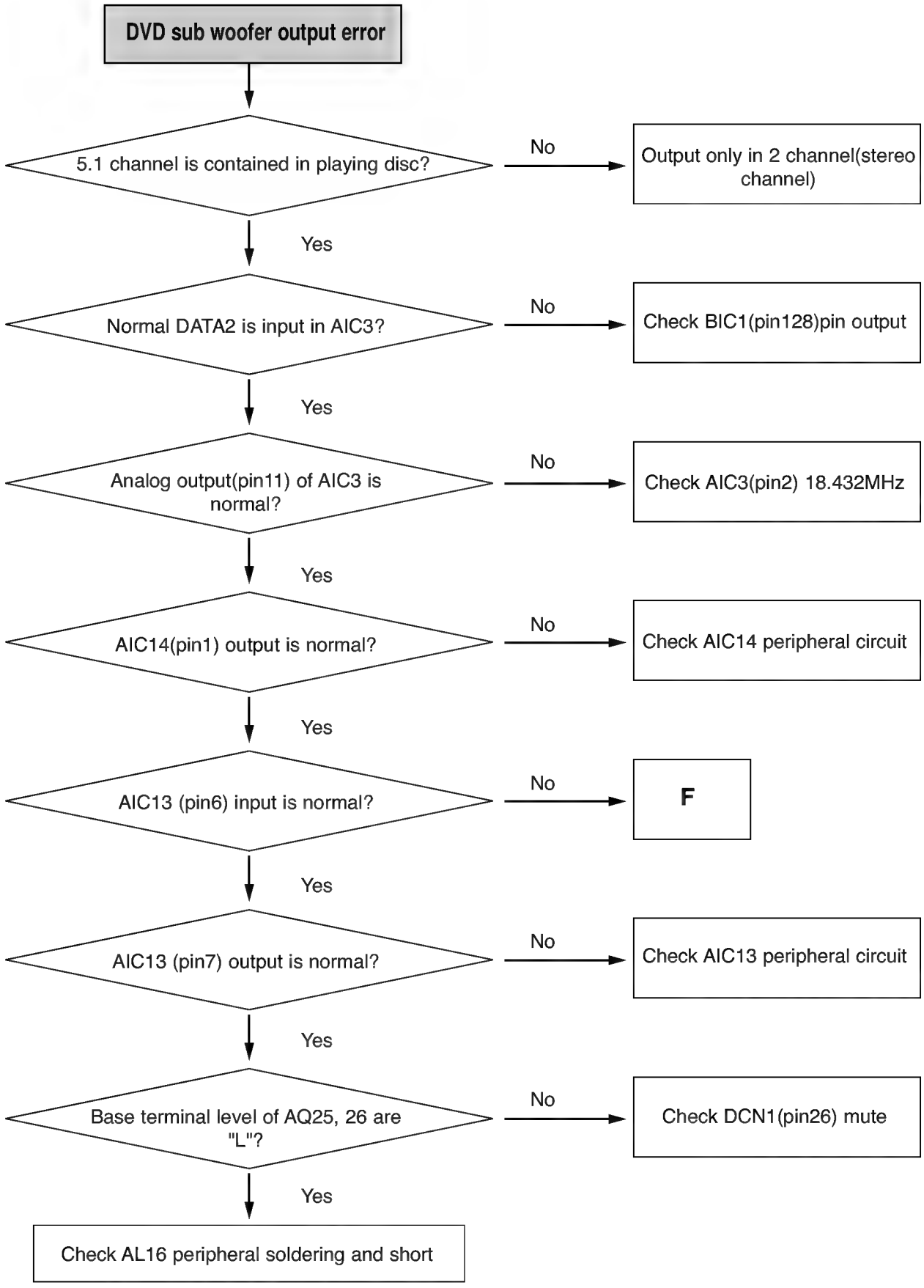

Video Output Error
27MHz clock input is normal at PIN4 in VIC1?
No
Check DL7 connection
YES
MRST signal is high at PIN40 in VIC1?
No
Check MIC1
YES
Control signal input is normal at PIN41,42 in VIC1?
No
Check signal connection between MIC1
YES
SYNC output is normal at PIN7,8 in VIC1?
No
Check every pin connection of VIC1
YES
Input data is normal at PIN9-16 in VIC1?
No
Check BIC1 connection
YES
E

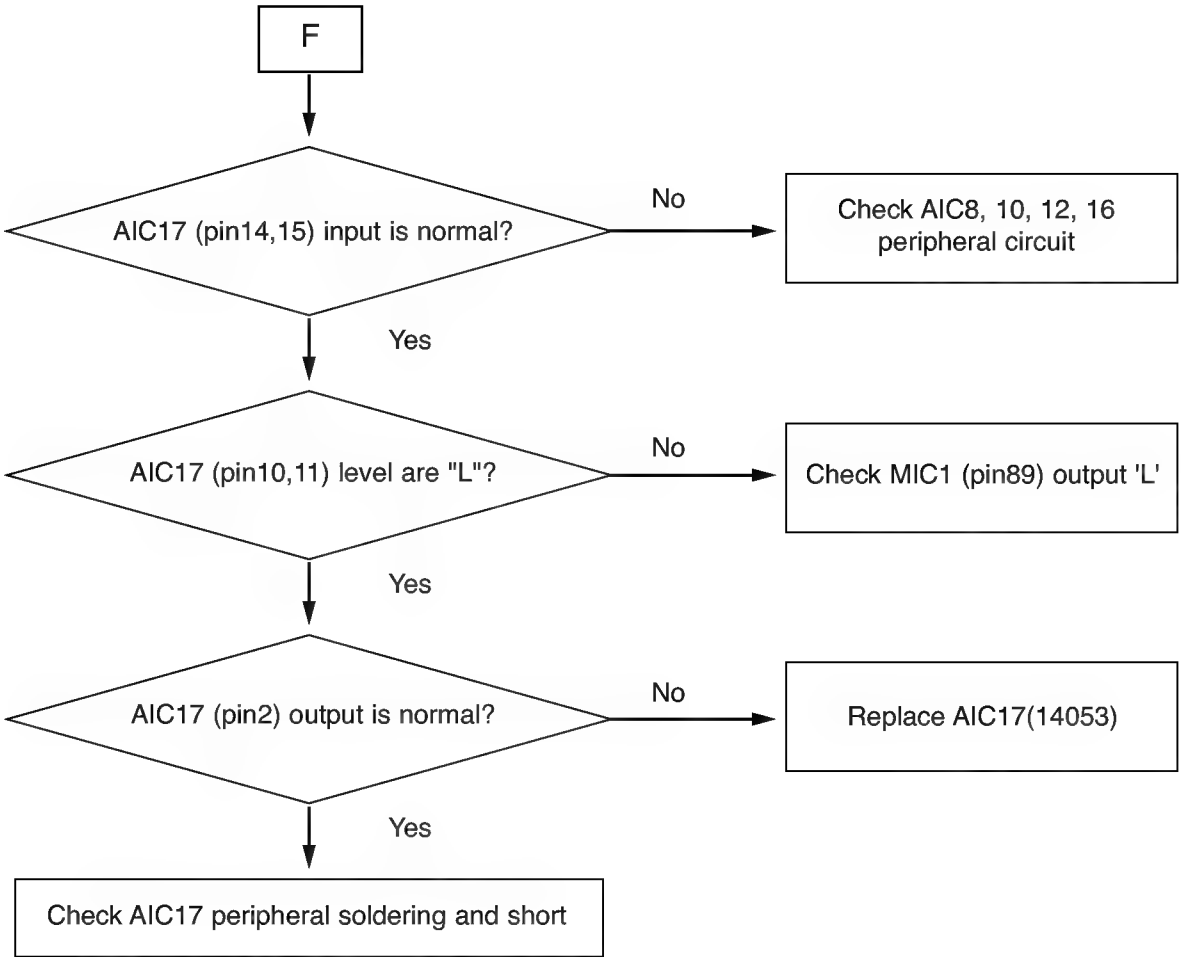

E
Video signal output is normal at PIN 30 in VIC1?
No
Check power pin connection in VIC1
YES
Video signal appears at input/output port in VF1?
No
Check VF1 connection
YES
Video signal of about 2V appears at collector in VQ3?
No
Check every device connection in Amplifier stage
YES
Video signal of about 2V appears at collector in VQ6?
No
Check every device connection in buffer unit
YES
Video Signal of about 1V appears at output pin in VJ1?
No
Check VC11,VR19,VL11 connection
YES
Check connection cable

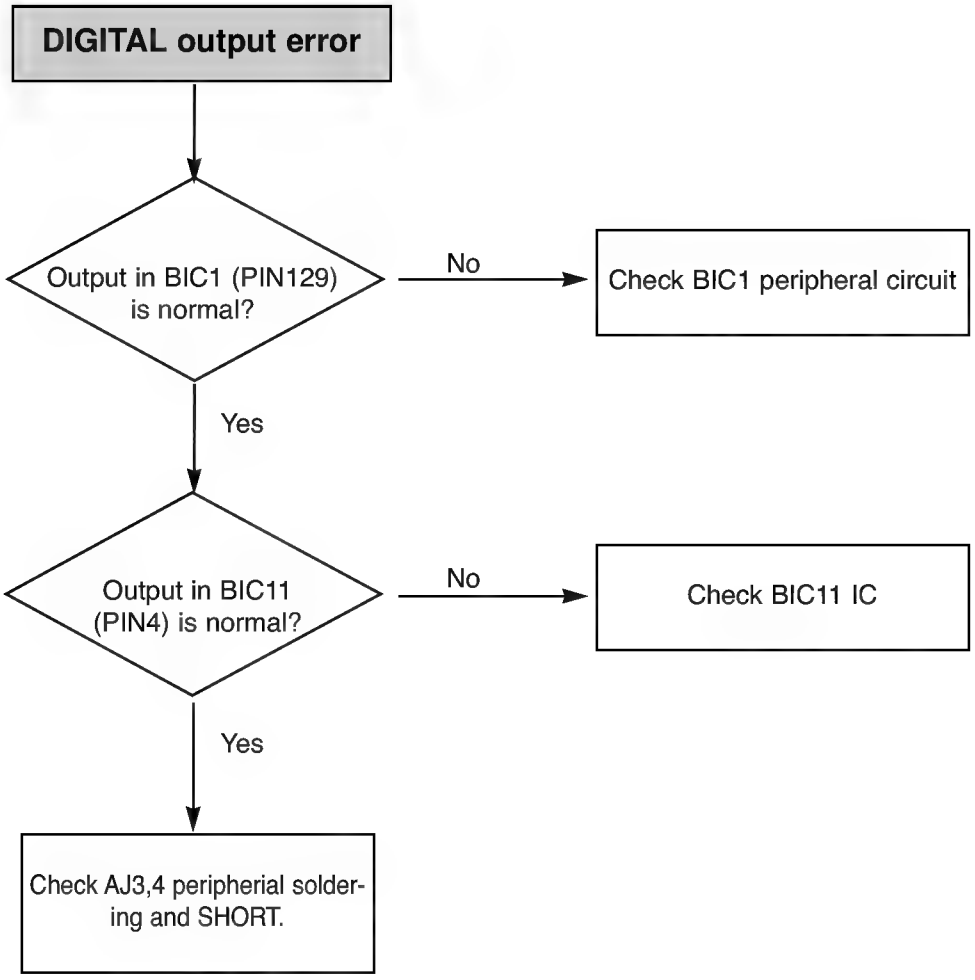

CD/VCD/DVD
front L/R output error
Normal DATA0 is input in AIC1(pin15)?
No
Check BIC1(pin123) ouput
Yes
Analog output (pin9, 12) of AIC1 is normal?
No
Check VIC3(pin2) 18.432MHz
Yes
AIC4,6 (pin1) output is normal?
No
Check AIC4,6 peripheral circui
Yes
AIC5,7(pin1) input is normal?
No
Check AIC5,7 peripheral circuit
Yes
Base terminal level of AQ5,6,9,10 are "L"?
No
Check DCN1(pin14) mute
Yes
Check AL9,10,11,12 peripheral soldering and short

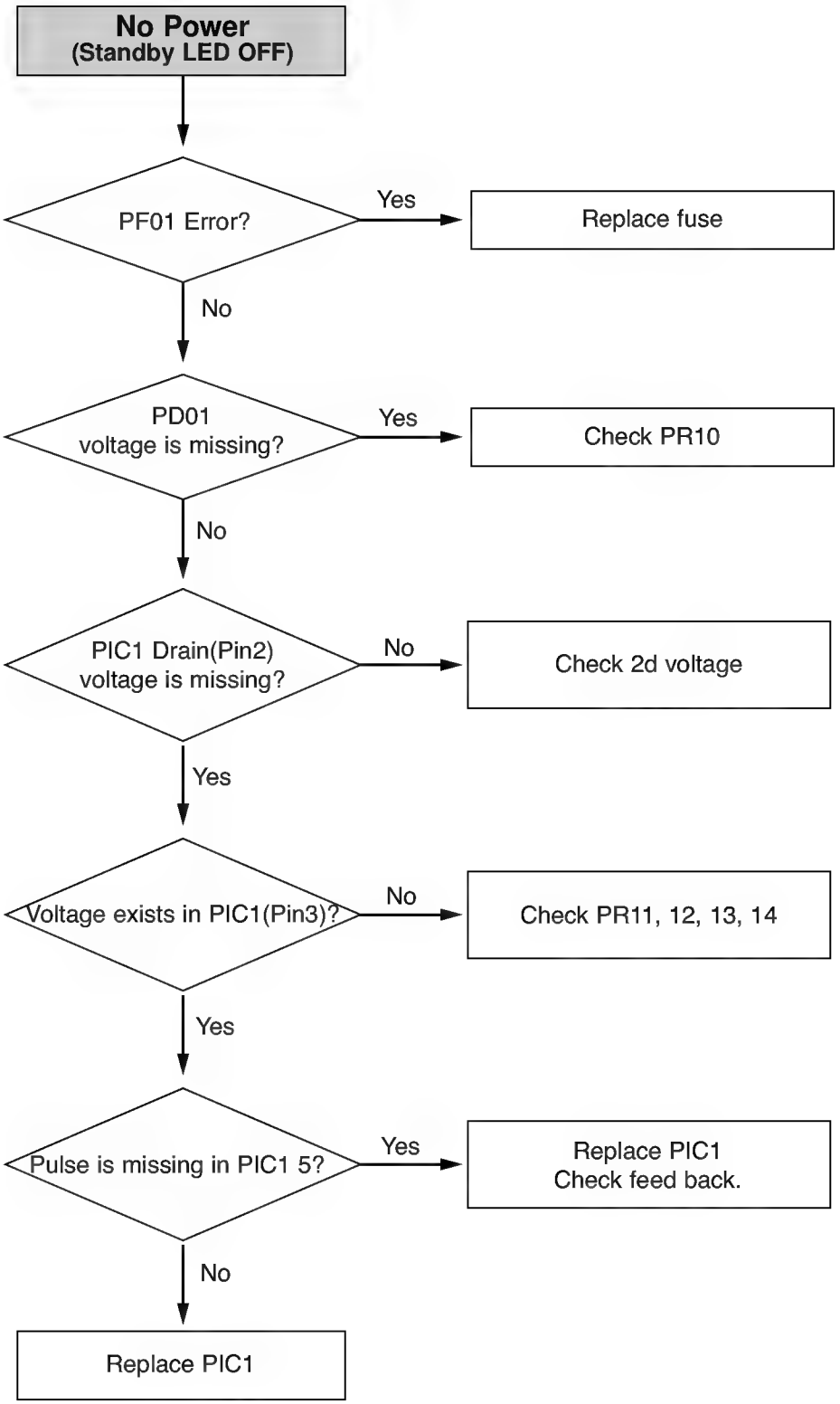

DVD REAR L/R output error
5.1 channel is contained in playing disc?
No
Output only in 2 channel(stereo channel)
Yes
Normal DATA1 is input in AIC2(pin15)?
No
Check BIC1(pin124) ouput
Yes
Analog output(pin 9,12) of AIC2 is normal?
No
Check AIC3(pin2)18.432MHz
Yes
AIC8,10(pin1) output is normal?
No
Check AIC8,10 peripheral circuit
Yes
AIC8,10(pin7) pin output is normal?
No
Check AIC8,10 peripheral circuit
Yes
AIC11(pin1,7) output is normal?
No
Check AIC11peripheral circuit
Yes
Base terminal level of AQ55,57,75,77are "L"?
No
Check DCN1(pin19) mute
Yes
Check AL13,14 peripheral soldering and short

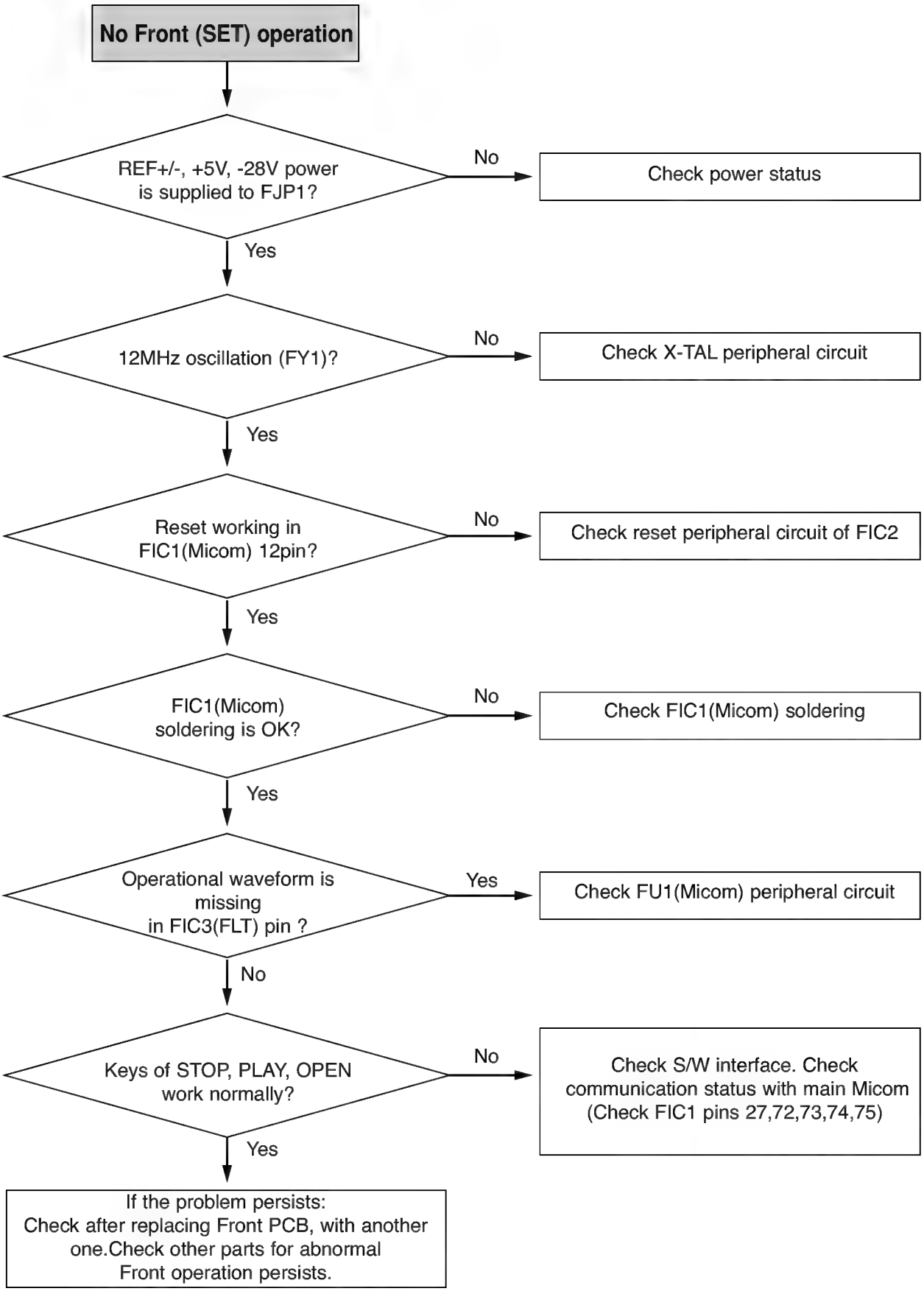

DVD center output error
5.1 channel is contained in playing disc?
No
Outputted only in 2 channel(stereo channel)
Yes
Normal DATA2 is input in AIC3?
No
Check BIC1(pin128) ouput
Yes
Analog output(pin14) of AIC3 is normal?
No
Check AIC3(pin2) 18.432MHz
Yes
AIC12(pin1,7) output is normal?
No
Check AIC12 peripheral circuit
Yes
AIC13(pin1) output is normal?
No
Check AIC13 peripheral circuit
Yes
Base ferminal level of AQ21,22 are “L”?
No
Check DCN1(pin26) peripheral circuit
Yes
Check AL15 peripheral soldering and short

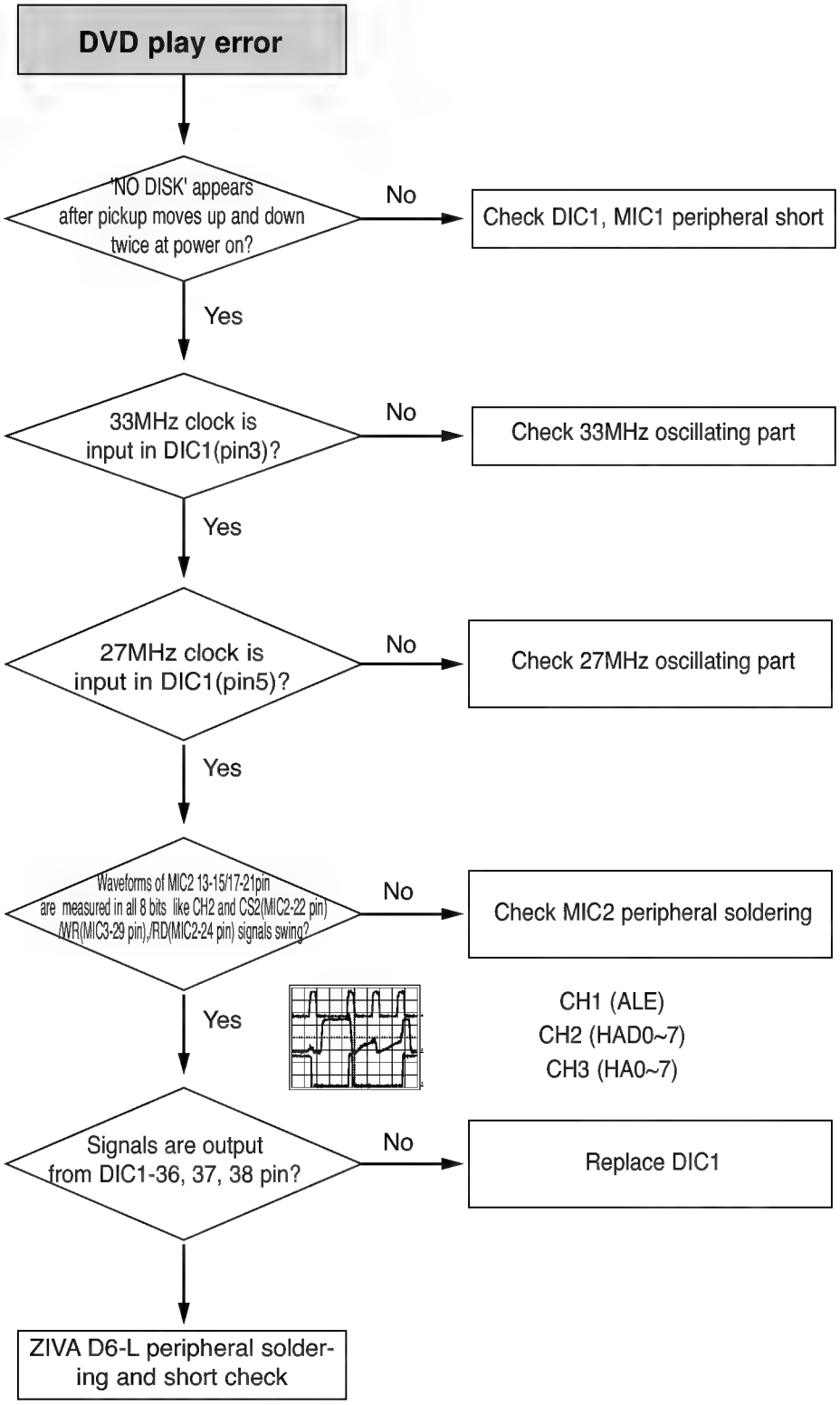

DVD sub woofer output error
5.1 channel is contained in playing disc?
No
Output only in 2 channel(stereo channel)
Yes
Normal DATA2 is input in AIC3?
No
Check BIC1(pin128)pin output
Yes
Analog output(pin11) of AIC3 is normal?
No
Check AIC3(pin2) 18.432MHz
Yes
AIC14(pin1) output is normal?
No
Check AIC14 peripheral circuit
Yes
AIC13 (pin6) input is normal?
No
F
Yes
AIC13 (pin7) output is normal?
No
Check AIC13 peripheral circuit
Yes
Base terminal level of AQ25, 26 are "L"?
No
Check DCN1(pin26) mute
Yes
Check AL16 peripheral soldering and short

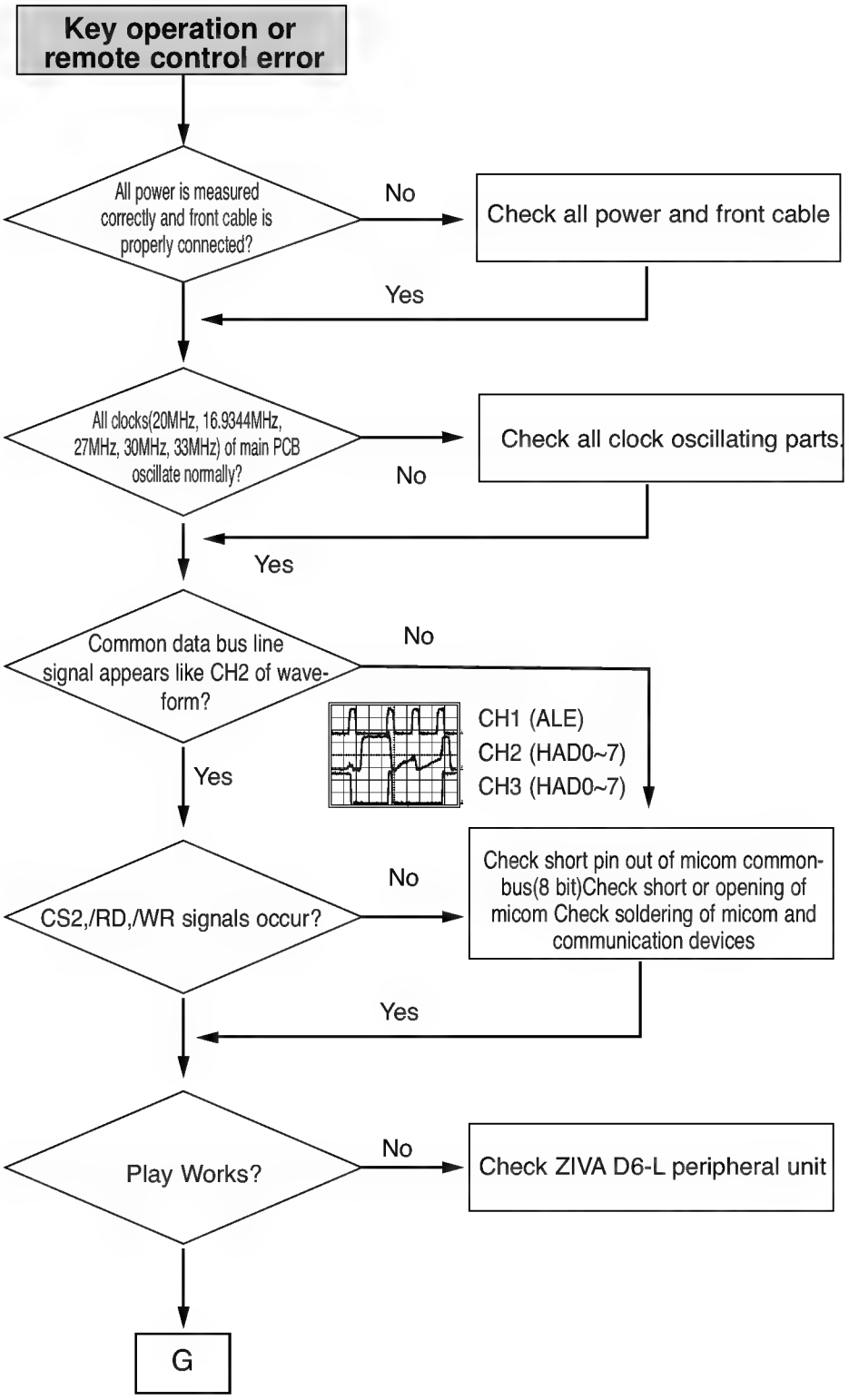

F
AIC17 (pin14,15) input is normal?
No
Check AIC8, 10, 12, 16 peripheral circuit
Yes
AIC17 (pin10,11) level are "L"?
No
Check MIC1 (pin89) output 'L'
Yes
AIC17 (pin2) output is normal?
No
Replace AIC17(14053)
Yes
Check AIC17 peripheral soldering and short

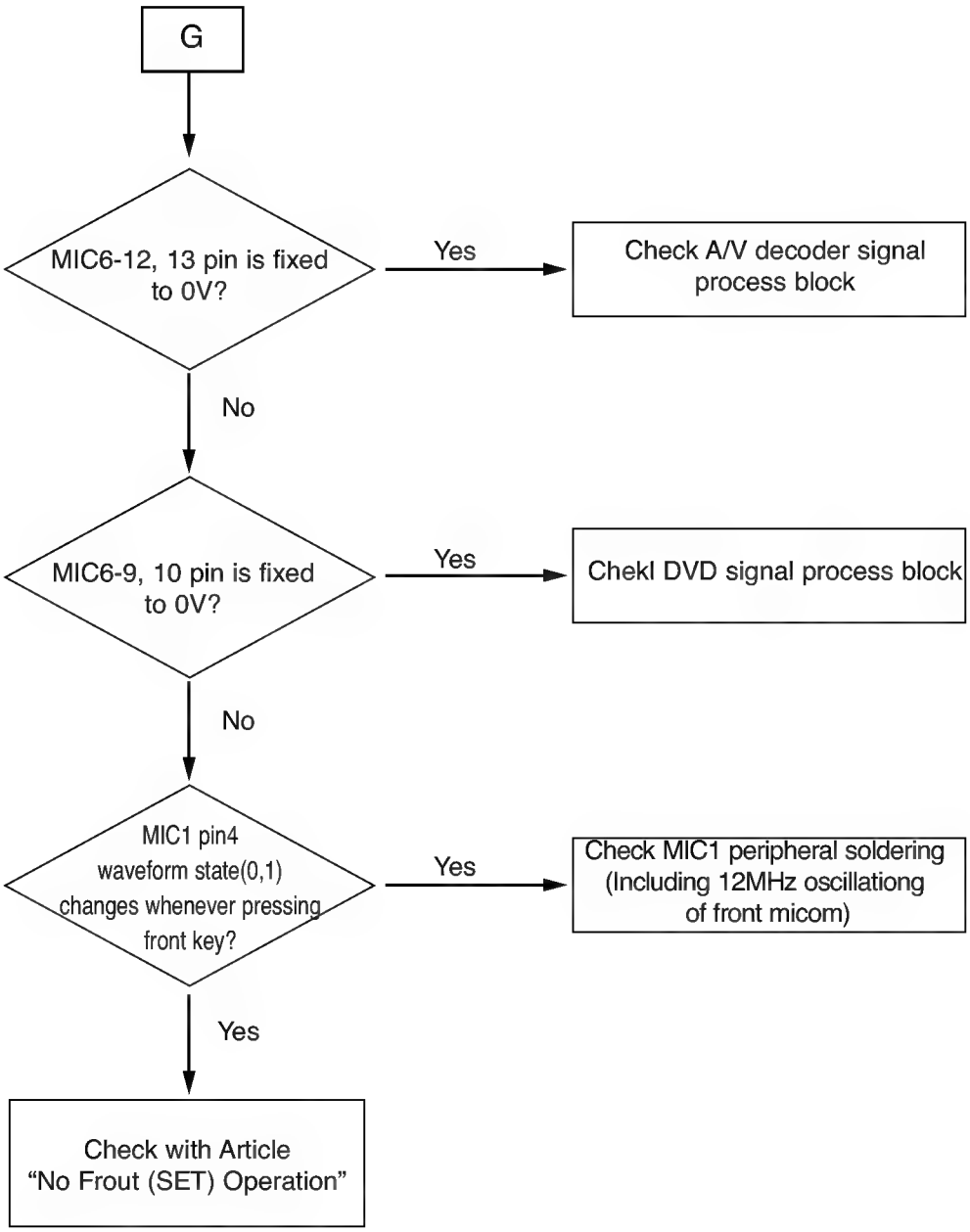

DIGITAL output error
Output in BIC1 (PIN129) is normal?
No
Check BIC1 peripheral circuit
Yes
Output in BIC11 (PIN4) is normal?
No
Check BIC11 IC
Yes
Check AJ3,4 peripherial solder-ing and SHORT.


No Power
(Standby LED OFF)
PF01 Error?
Yes
Replace fuse
No
PD01
voltage is missing?
Yes
Check PR10
No
PIC1 Drain(Pin2)
voltage is missing?
No
Check 2d voltage
Yes
Voltage exists in PIC1(Pin3)?
No
Check PR11, 12, 13, 14
Yes
Pulse is missing in PIC1 5?
Yes
Replace PIC1
Check feed back.
No
Replace PIC1


No Front (SET) operation
REF+/-, +5V, -28V power is supplied to FJP1?
No
Check power status
Yes
12MHz oscillation (FY1)?
No
Check X-TAL peripheral circuit
Yes
Reset working in FIC1(Micom) 12pin?
No
Check reset peripheral circuit of FIC2
Yes
FIC1(Micom) soldering is OK?
No
Check FIC1(Micom) soldering
Yes
Operational waveform is missing in FIC3(FLT) pin ?
Yes
Check FU1(Micom) peripheral circuit
No
Keys of STOP, PLAY, OPEN work normally?
No
Check S/W interface. Check communication status with main Micom (Check FIC1 pins 27,72,73,74,75)
Yes
If the problem persists: Check after replacing Front PCB, with another one.Check other parts for abnormal Front operation persists.


DVD play error
'NO DISK' appears after pickup moves up and down twice at power on?
No
Check DIC1, MIC1 peripheral short
Yes
33MHz clock is input in DIC1(pin3)?
No
Check 33MHz oscillating part
Yes
27MHz clock is input in DIC1(pin5)?
No
Check 27MHz oscillating part
Yes
Waveforms of MIC2 13-15/17-21pin are measured in all 8 bits like CH2 and CS2(MIC2-22 pin) /WR(MIC3-29 pin),/RD(MIC2-24 pin) signals swing?
No
Check MIC2 peripheral soldering
Yes
CH1 (ALE)
CH2 (HAD0~7)
CH3 (HA0~7)
Signals are output from DIC1-36, 37, 38 pin?
No
Replace DIC1
ZIVA D6-L peripheral solder-ing and short check


Key operation or remote control error
All power is measured correctly and front cable is properly connected?
No
Check all power and front cable
Yes
All clocks(20MHz, 16.9344MHz, 27MHz, 30MHz, 33MHz) of main PCB oscillate normally?
No
Check all clock oscillating parts.
Yes
Common data bus line signal appears like CH2 of wave-form?
No
CH1 (ALE)
CH2 (HAD0~7)
CH3 (HAD0~7)
Yes
CS2,/RD,/WR signals occur?
No
Check short pin out of micom common-bus(8 bit)Check short or opening of micom Check soldering of micom and communication devices
Yes
Play Works?
No
Check ZIVA D6-L peripheral unit
G


G
MIC6-12, 13 pin is fixed to 0V?
Yes
Check A/V decoder signal process block
No
MIC6-9, 10 pin is fixed to 0V?
Yes
Chekl DVD signal process block
No
MIC1 pin4 waveform state(0,1) changes whenever pressing front key?
Yes
Check MIC1 peripheral soldering (Including 12MHz oscillationg of front micom)
Yes
Check with Article "No Frout (SET) Operation"

9. Exploded Views and Parts List

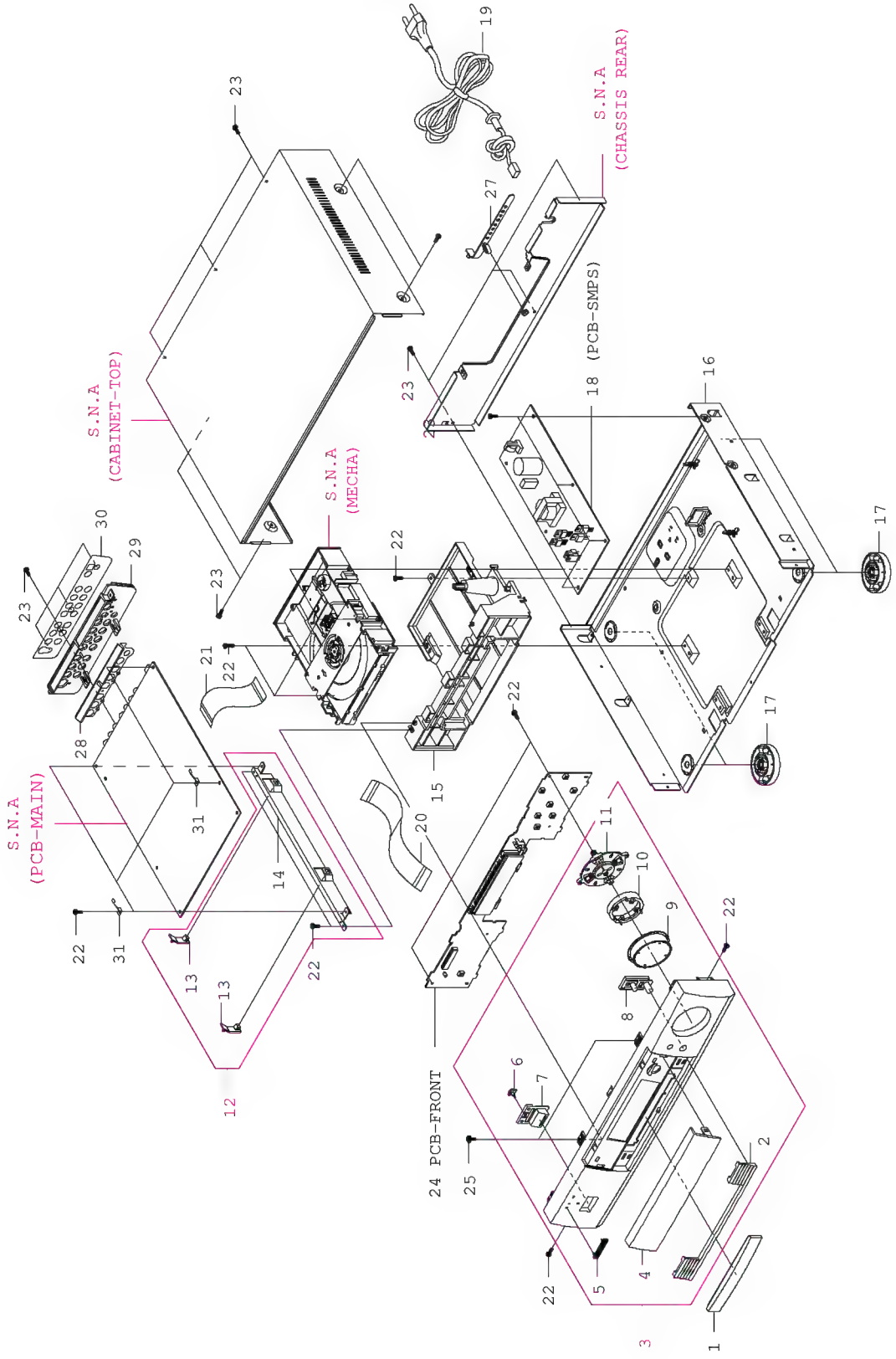
9-1 Exploded View DVD-907

9-2 Exploded View DVD-927

9-3 Deck Exploded View

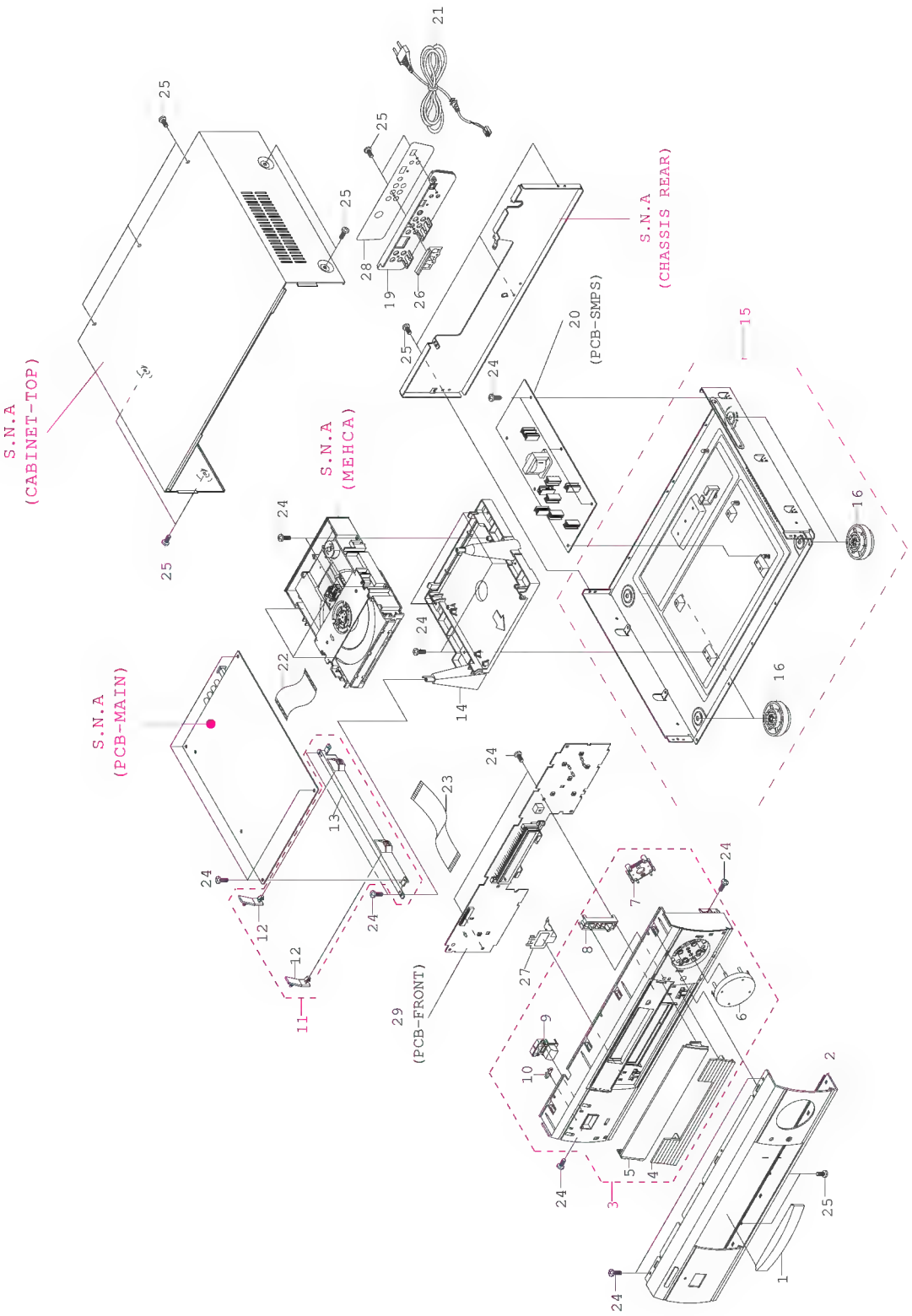
9-4 Remote Control

9-1 Exploded View (DVD-907)



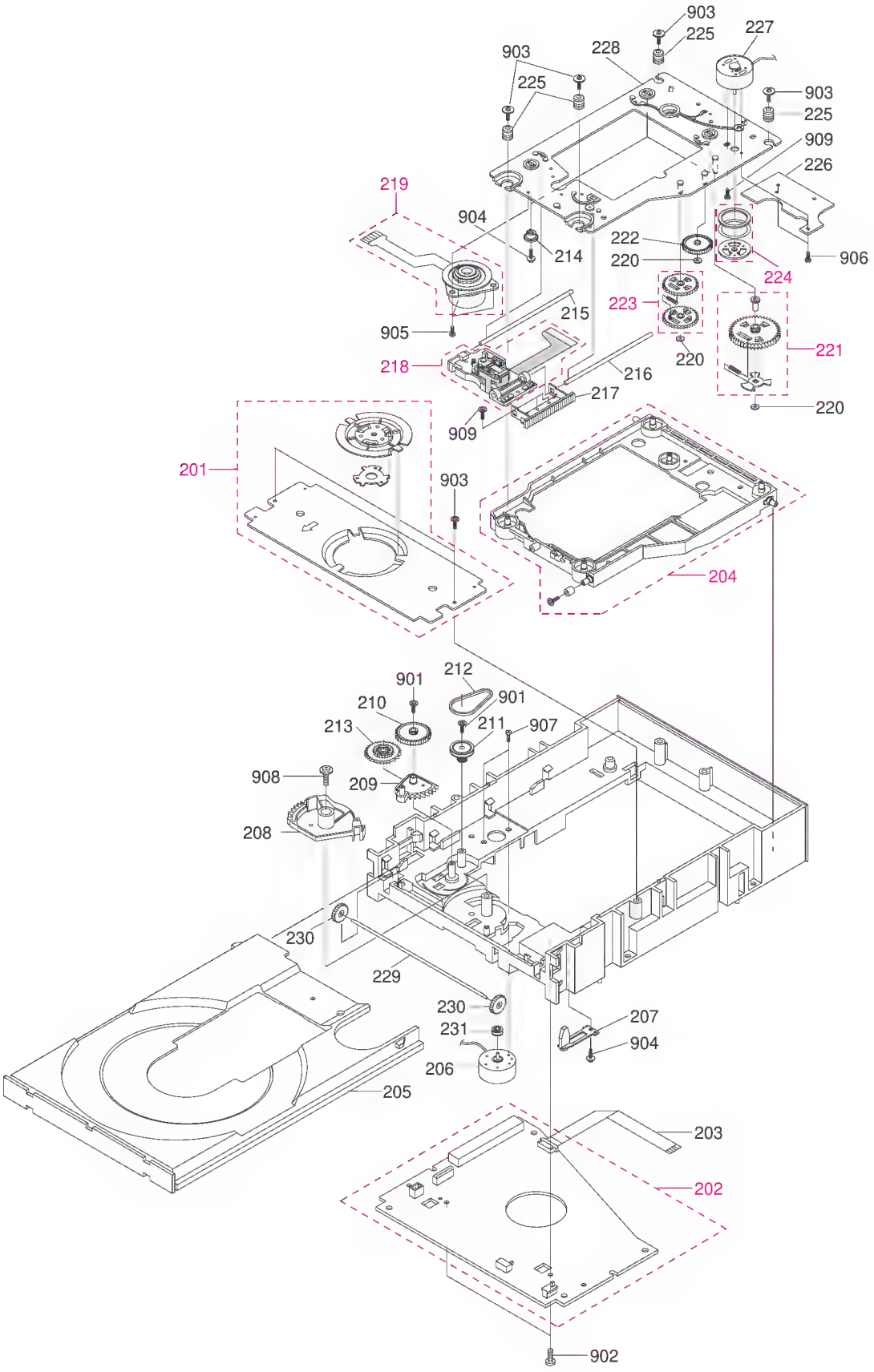
Loc. No	New Part No	Description and Specification	Remark
1	AH95-50320B	ASSY-DOOR,TRAY;DVD-907,ABS+PBS T0.2,DVD	
2	AH63-30235B	COVER-CENTER;-,ABS94,HB,-,BLK,-,-,DVD907	
3	AH95-10328B	ASSY-CABINET FRONT;DVD-907,ASSY,EXPORT,S	
4	AH64-40420B	WINDOW-FLT;-,PMMA,-,T2.5,VIOLET,-,DVD907	
5	AH64-70003D	BADGE-BRAND;AL,-,L35,-,-,	
6	AH64-40419A	INDICATOR-POWER;-,PMMA,HB,T2.5,MILK,-,DV	
7	AH64-11167B	KNOB-POWER;-,ABS94,HB,BLK,H/S,DVD-907	
8	AH64-11168A	KNOB-OPEN;-,ABS94,HB,SIL,-,DVD-670	
9	AH64-11183B	KNOB-PLAY;-,ABS94,HB,BLK,-,DVD-907	
10	AH64-40422A	INDICATOR-PLAY;-ABS,HB,-SIL,-,DVD-670	
11	AH61-20474A	HOLDER-PLAY;-,ABS94,HB,BLK,-,DVD-670	
12	AH95-50238A	ASSY-BRKT PCB;DVD-860K,SECC+NYLON,-	
13	AH61-20279A	HOLDER-PWB;NYLON66,-,-,-,VIP680T	
14	AH61-10692A	BRACKET-PCB;-,SECC,-,T1.0,NTR,-,DVD-860K	
15	AH61-10721B	FRAME-CHASSIS;-,ABS94,HB,-,L180,W240,H70	
16	AH95-10329B	ASSY-CABINET BOTTOM;DVD-907,ASSY,EXPORT	
17	AH95-50252A	ASSY-FOOT;DVD-860,ABS+EVA SPONGE,-	
18	AH90-10746U	ASSY-PCB POWER;DVD-907,XXA	
19	AH39-10060M	POWER-CORD;KKP-10W,SPT-2,AWG2/18,1.83MT,	
22	6003-000276	SCREW-TAPTITE;BH,+,B,M3,L10,ZPC(YEL),SWC	
23	6003-000275	SCREW-TAPTITE;BH,+,B,M3,L10,BLK,SWCH101	
24	6003-000277	SCREW-TAPTITE;BH,+,B,M3,L12,ZPC(YEL),SWR	
25	6003-000256	SCREW-TAPTITE;BHW,+,B,M3,L10,ZPC(YEL),SM	
26	AH90-10746V	ASSY- PCB FRONT;DVD-907,XXA	
27	AH65-20001A	CABLE-CLAMP;-,PE,-,BLK,-,DV532KV	
28	AH63-40163A	GROUND-REAR;-,PBS,TO.2,-,DVD-860	
29	AH63-30228A	COVER-REAR;-,ABS94,HB,T2,BLK,-,-,DVD-860	
30	AH64-60055D	INLAY-REAR;-,PVC SHEET,T0.5,L186.8 W36.2,	
31	AH61-10692A	BRACKET-PCB;-,SECC,-,T1.0,NTR,-,DVD-860K	

9-2 Exploded View(DVD-927)



Loc. No	New Part No	Description and Specification	Remark
1	AH95-50295A	ASSY-DOOR;DVD-905,ABS+PBS T0.2,DVD BADGE	
2	AH95-50239C	ASSY-COVER PANEL;DVD-905,AL+BADGE,SILVER BADGE	
3	AH95-10321A	ASSY-CABINET FRONT;DVD-860,ABS,-	
4	AH63-30220A	COVER-CENTER;-,AL,-,T2.0,TITAN,HAIRLINE,-,D	
5	AH64-40401A	WINDOW-FLT;-,PMMA,V0,T2.5,VIOLET,-,DVD-86	
6	AH95-50251A	ASSY-KNOB PLAY;DVD-860,ABS,-	
7	AH61-20438A	HOLDER-PLAY;-,ABS,HB,WHT,-,DVD-860	
8	AH64-11144A	KNOB-OPEN;-,ABS94,HB,BLK,-,DVD-860	
9	AH64-11143A	KNOB-POWER;-,ABS94,HB,BLK,-,DVD-860	
10	AH64-40402A	INDICATOR-POWER;-,PMMA,HB,T2.5,MILK,-,DVD-860	
11	AH95-50238A	ASSY-BRKT PCB;DVD-860K,SECC+NYLON,-	
12	AH61-20279A	HOLDER-PWB;NYLON66,-,-,-,VIP680T,	
13	AH61-10692A	BRACKET-PCB;-,SECC,-,T1.0,NTR,-,DVD-860K	
14	AH61-10694A	FRAME-CHASSIS;-,ABS94,HB,T3,L200,W180,H100,B	
15	AH95-10322A	ASSY-CABINET BOTTOM;DVD-860K,SECC+ABS,-	
16	AH95-50252A	ASSY-FOOT;DVD-860,ABS+EVA SPONGE,-	
19	AH63-30228A	COVER-REAR;-,ABS94,HB,T2,BLK,-,-,DVD-860	
20	AH90-10682A	ASSY-PCB SMPS;DVD860,DOM	
21	AH39-10002G	POWER CORD;CP,VCTFK-0.75X2,1.8M,5239,KS	
22	3809-001030	CABLE-FLAT;30V,80C,110MM,8P,1MM,UL2	
23	3809-001025	CABLE-FLAT;30V,80C,270MM,28P,1.25MM,UL289	
24	6003-000276	SCREW-TAPTITE;BH,+,B,M3,L10,ZPC(YEL),SWCH1018AK	
25	6003-000275	SCREW-TAPTITE;BH,+,B,M3,L10,BLK ,SWCH1018AK	
26	AH63-40163A	GROUND-REAR;-,PBS,T0.2,-DVD-860	
27	AH63-40161A	GROUND-FRONT;-,PBS,T0.2,-,DVD-860	
28	AH64-60055A	INLAY-REAR;-,PVC SHHET,T0.3,L186.8 W36.2,	
29	AH90-10727U	ASSY- PCB FRONT;DVD858V,CHN	

9-3 Deck Exploded View

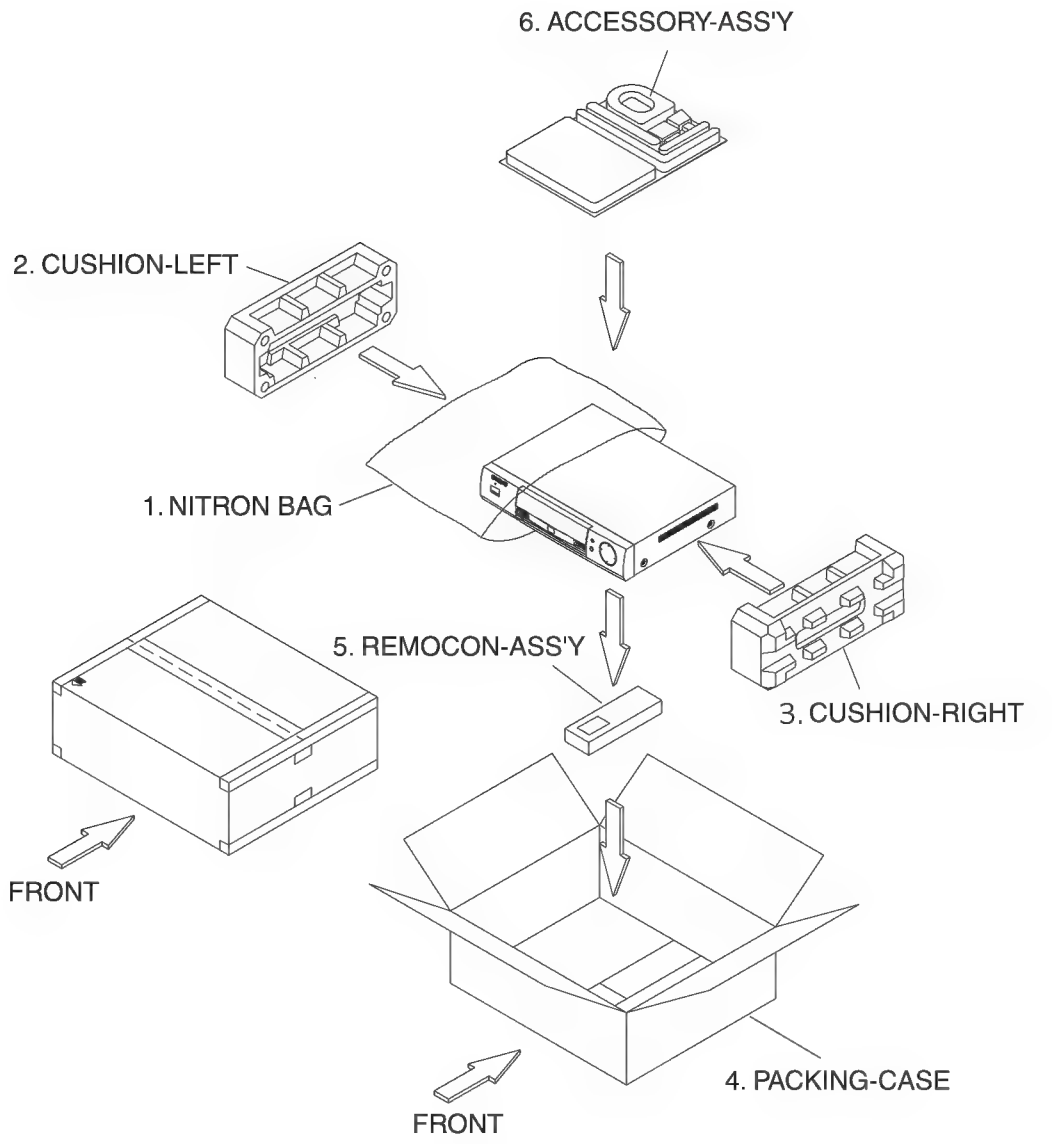


Loc. No	New Part No	Description and Specification	Remark
201	AH91-60117A	ASSY-DECK CLAMPER;DVD860,-,DP-1	
202	AH90-10685B	ASSY-PCB DECK;DVD860,DOM	
203	3809-001030	CABLE-FLAT;30V,80C,110MM,1MM,8P,UL2	
204	AH91-60126A	ASSY-CHASSIS SUB;DP-1,DVD860,-	
205	AH66-90054A	TRAY-DVD;DP,ABS,-,BLK,-,DP-1	
206	AH31-10028A	MOTOR-FEED;DP,RF-300C-11440,D/V5.9,60HZ	
207	AH66-30087A	LEVER-OPEN SW;DP,KEPITAL,T0.7,L26,F20-03 BLK	
208	AH66-20194A	GEAR-CAM CENTER;DP,KEPITAL F20-03,M1.2,Z7,BLK,	
209	AH66-20183A	GEAR-CAM SUB;DP,KEPITAL FT2020,M1,2,Z7,-,PC	
210	AH66-20185A	GEAR-TRAY A;DP,KEPITAL F20-03,M0.4/M0.5,Z5	
211	AH66-10024A	PULLEY-GEAR;DP,KEPITAL F20-03,BLK,DP-1	
212	AH66-60033A	BELT-PULLEY;DP,NBR,T1.5,0.08,L82.7,BLK,DP-	
213	AH66-20184A	GEAR-TRAY;DP,KEPITAL F20-03,M0.5/M0.6,Z4	
214	AH61-20424A	HOLDER-CAM;DP,KEPITAL,-,BLK,F20-03,DP-1	
215	AH61-50284A	SHAFT-P.U(L);DP,SUS420J2,OD3,L79,	
216	AH61-50278A	SHAFT-P.U(R);DP,SUS420J2,OD3,L87,-,NTR,DP-1	
217	AH66-20178A	RACK-SLIDE;DP,KEPITAL F20-03,WHT,M0.4,P1.	
218	AJ30-20035F	PICK-UP;SOH-D1A	
219	AH91-60134A	ASSY-MOTOR SPINDLE;DP-2,SDR-130	
220	AH60-30020A	WASHER-PLAIN;DP,-,ID3.1,OD6,T0.3,RED COLOR,	
221	AH91-60120A	ASSY-GEAR-FEED-AU/AL;DP-1,DVD-860,-	
222	AH66-20182A	GEAR-FEED B;DP,KEPITAL F20-03,M0.4,Z44,WHT	
223	AH91-60121A	ASSY-GEAR-FEED-CU/CL;DP-1,DVD-860,-	
224	AH91-60122A	ASSY-GEAR-MAGNET;DP-1,DVD-860,-	
225	AH73-10017A	RUBBER-INSULATOR;RUBBER(LB-40),OD11,DP-1,-	
226	AH90-10694A	ASSY-PCB HALL SENSOR;SDR-130,DOM	
227	AH31-10028A	MOTOR-FEED;DP,RF-300C-11440,D/V5.9,60HZ	
228	AH91-60125A	ASSY-BRKT DECK;DP-1,DVD860,-	
229	AH61-50279A	SHAFT-SYNCRO;DP,SUM24L+ZN,OD2,L119,ZPC,YEL,	
230	AH66-22005A	GEAR-SYNCRO-A;DP,KEPITAL F20-03,M0.5,Z16,BLK	
231	AH66-10023A	PULLEY-MOTOR;DP,KEPITAL F20-03,BLK,	
901	AH60-10151A	SCREW-TAP TITE;DP,SPEC6.8 ,PH,+,CP,M2,L5,ZPC	
902	AC60-10051A	SCREW-TAPPING;BH,-,-,M3,L8,FZY	
903	AH60-10143U	SCREW-TAP TITE;DP,PH,+,SPEC,TAP1.7,L5,ZPC	
904	AH60-10145A	SCREW-TAP TITE;DP,PH,+,SPEC OD5.5 FP,TAP1.7,L	
905	AH60-10147A	SCREW-MACHINE;DP,CH,+,FP,M2,L4,ZPC,SWRCH10A,	
906	AH60-10143Q	SCREW-MACHINE;DP,CH,+,FP,M1.7,L4,ZPC,SWRCH10	
907	6001-000012	SCREW-MACHINE;CH,+,M1.7,L2.0,NYLOCK(WHT),SW	
908	AC60-10042A	SCREW-TAPPING;PWH,+,-,M3,L8,-	
909	6001-000002	SCREW-MACHINE;CH,+,M1.7,L3	

9-4 Remote Control

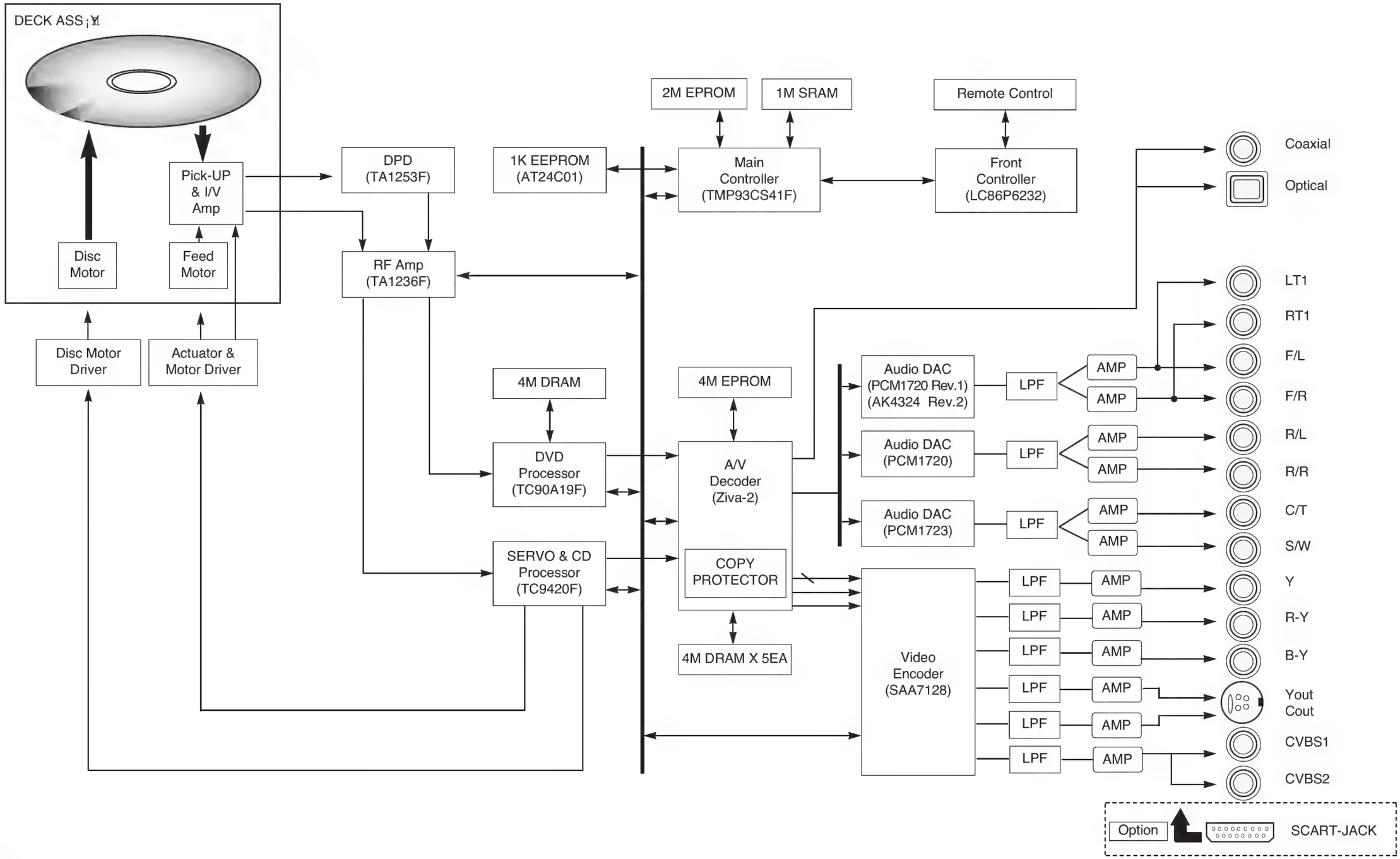
AH59-10087D REMOCON-ASSY;-,-,-,48,DVD905,S.S
AH64-50327A DOOR-BATTERY;-,ABS94,HB,T2,L71 W60 H18,D/GR

10. Packing Diagram



MEMO

12. Block Diagram



13. PCB Diagrams

13-1 MAIN Rev.1

13-1-1 COMPONENT SIDE

13-1-2 SOLDER SIDE

13-2 FRONT (DVD-907)

13-3 FRONT (DVD-927)

13-4 SMPS

13-5 DECK

13-6 MAIN Rev.2

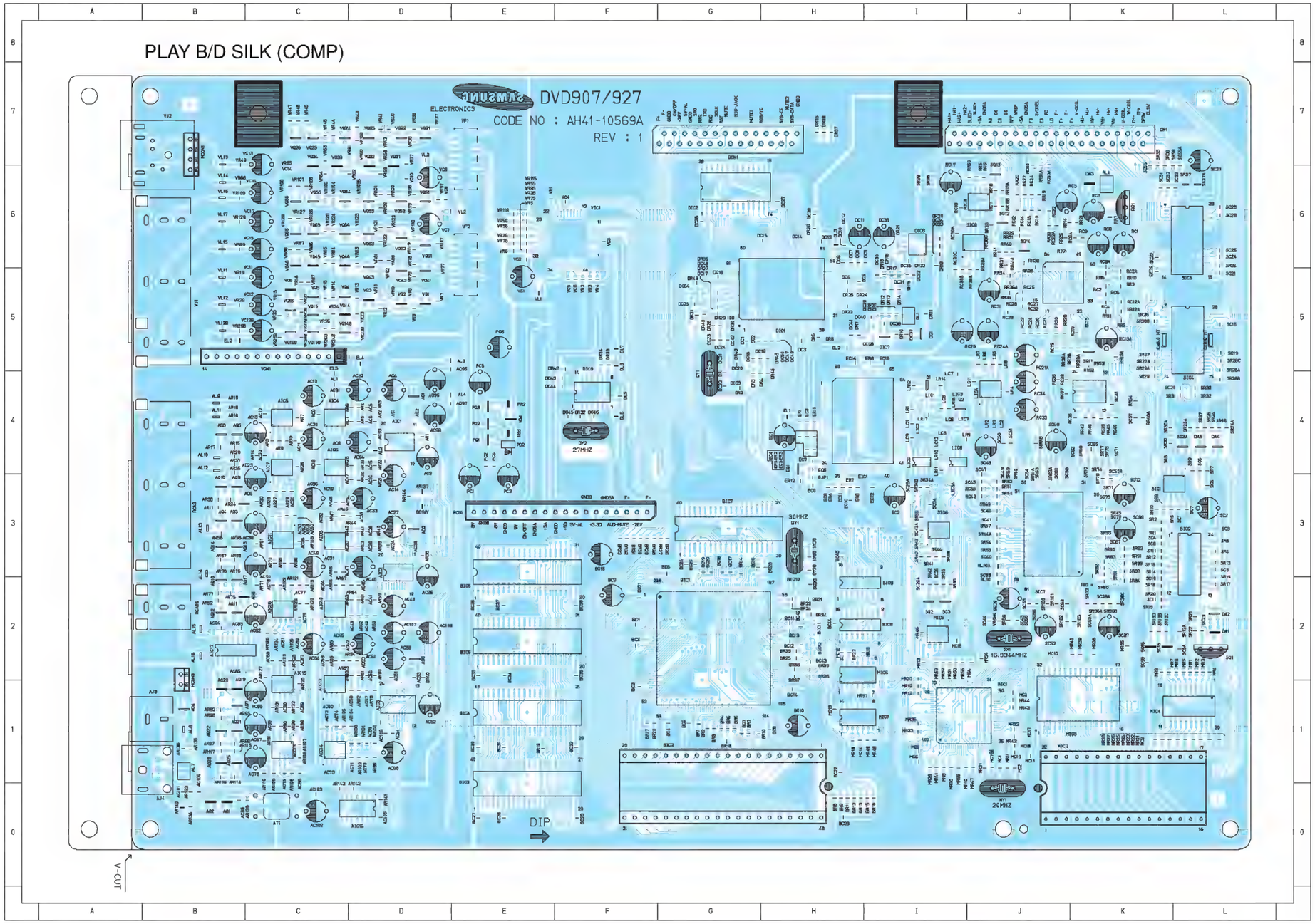
13-6-1 COMPONENT SIDE

13-6-2 SOLDER SIDE

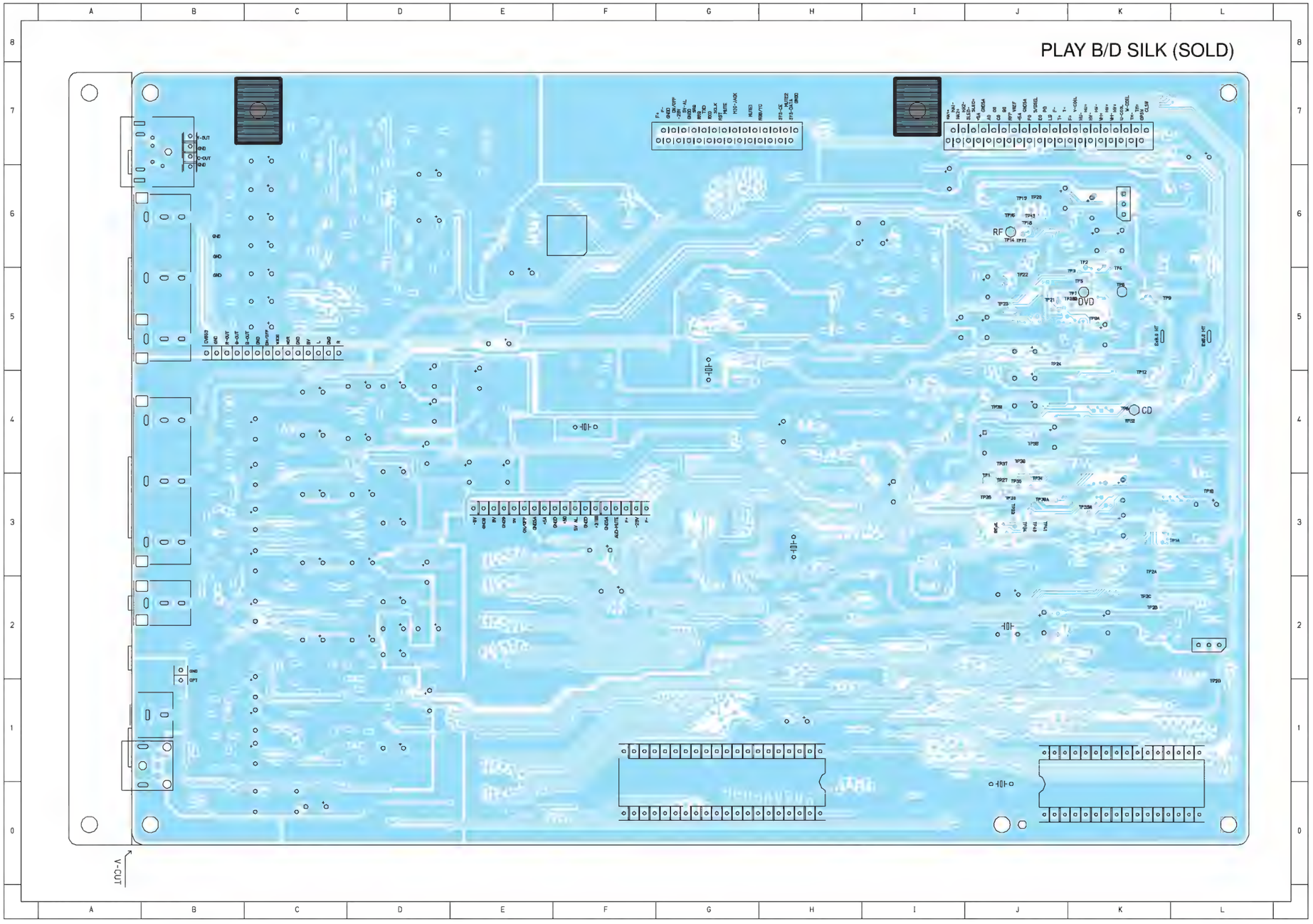
13-7 SCART JACK

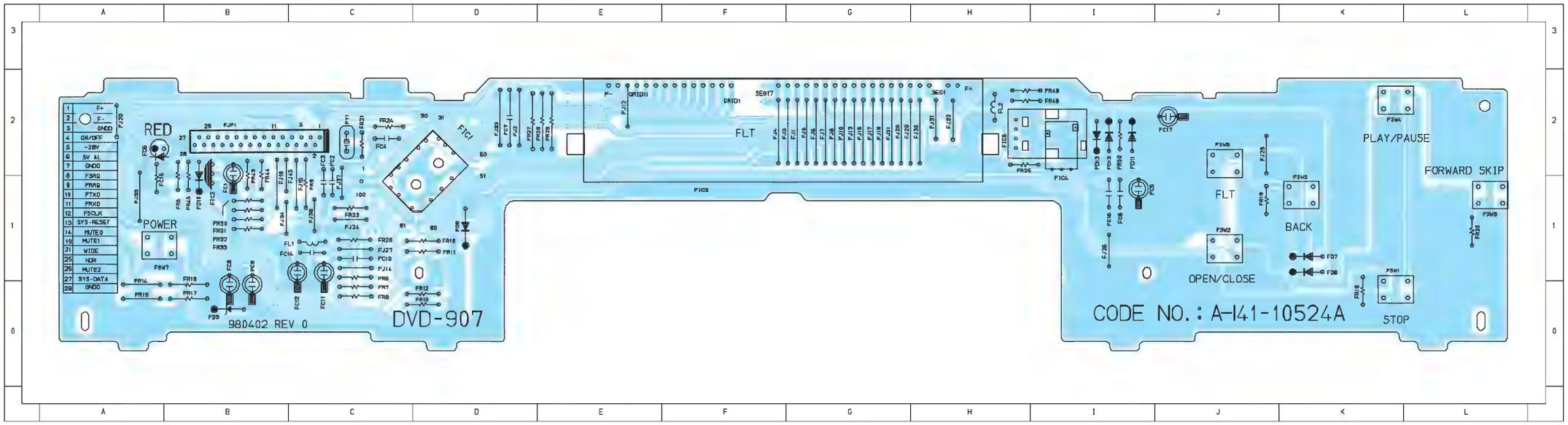
13-1 MAIN

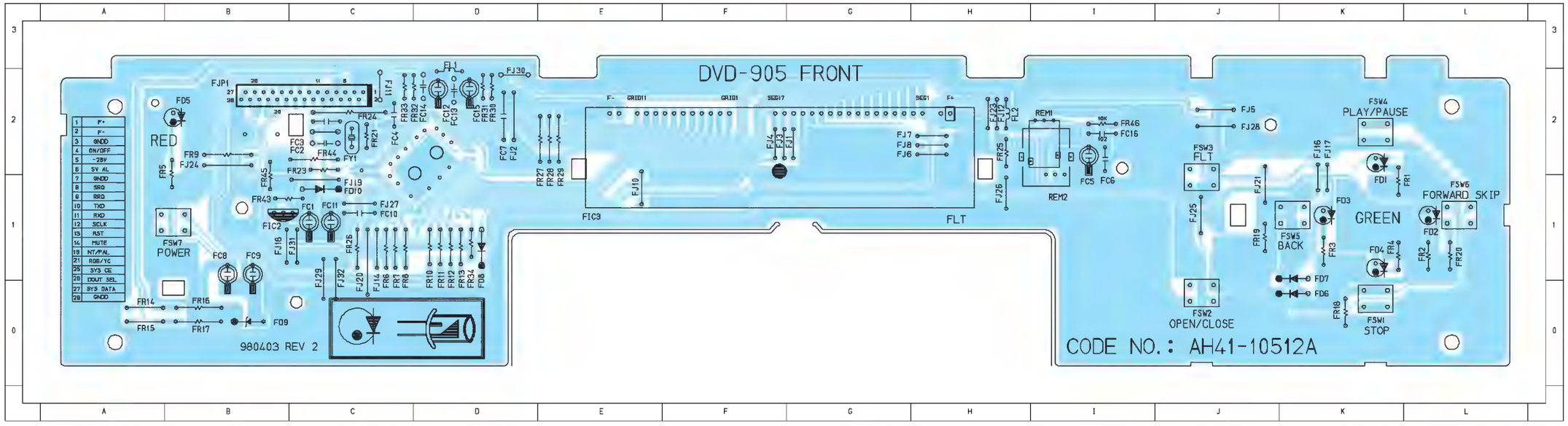
13-1-1 COMPONENT SIDE

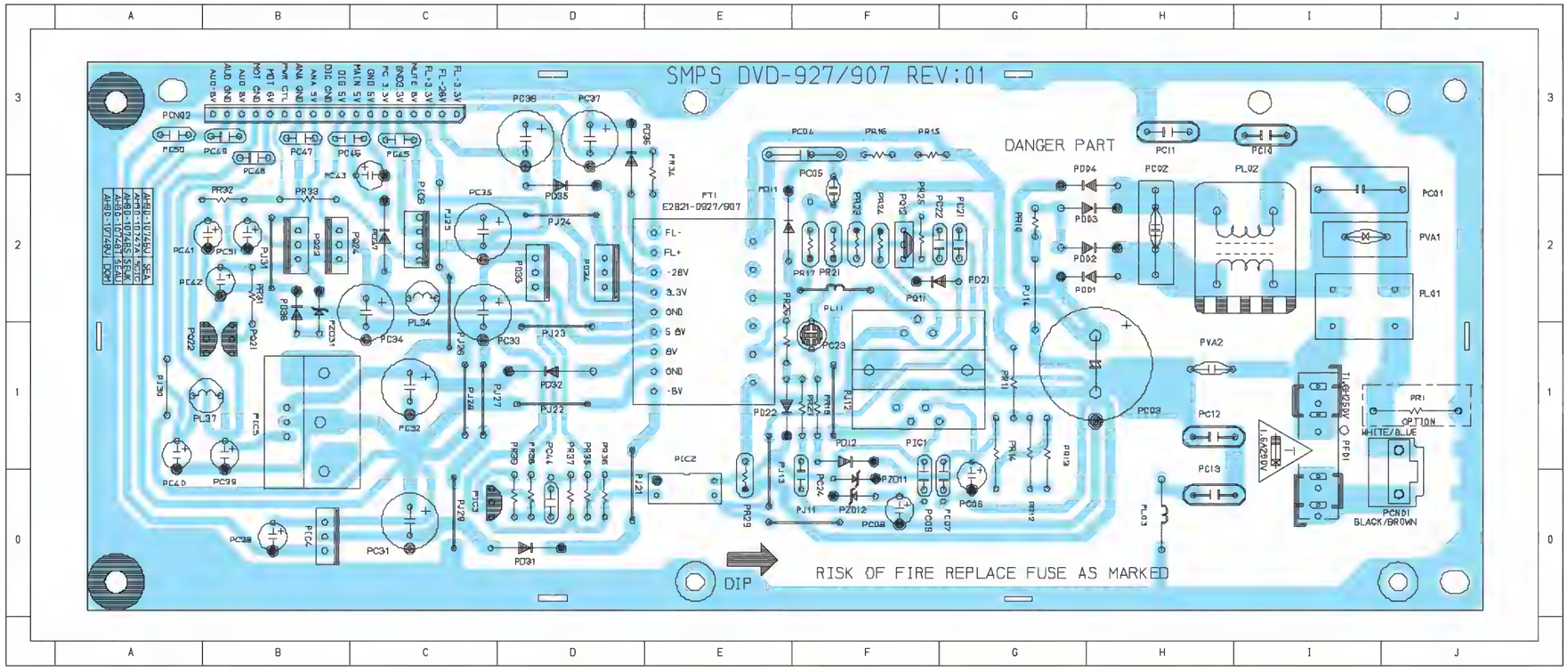


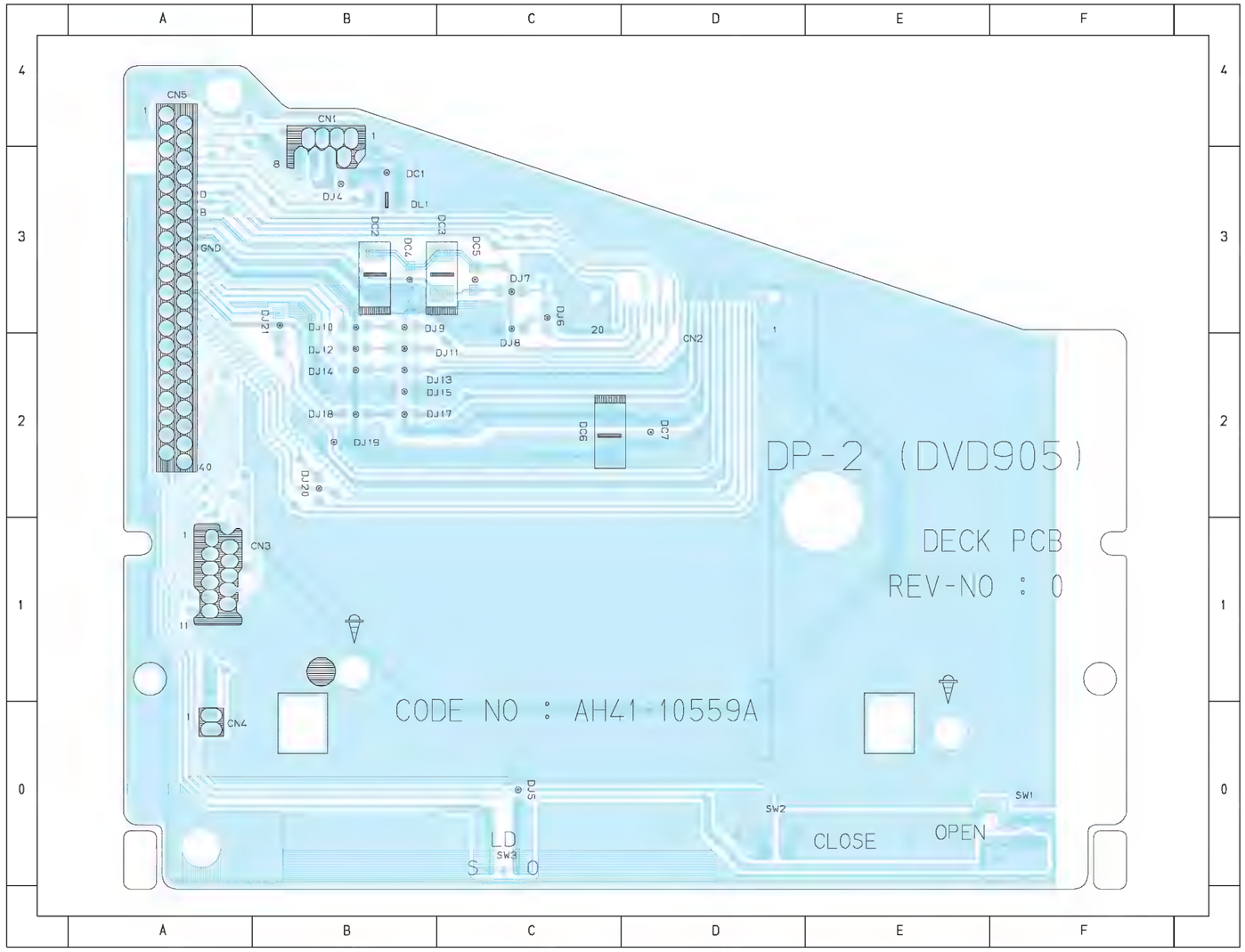
13-1-2 SOLDER SIDE

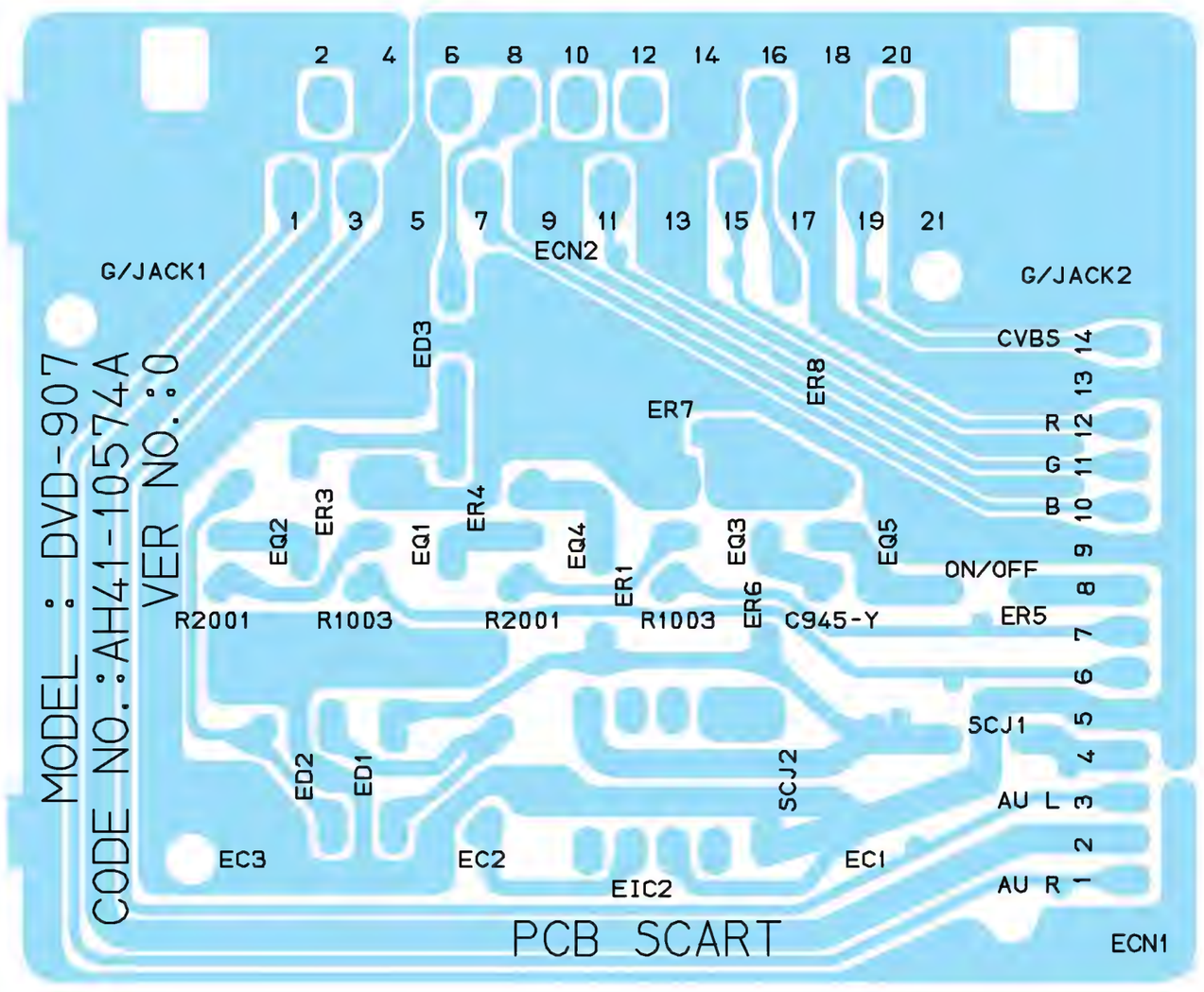



RED
POWER
FLT
980402 REV 0
DVD-907
PLAY/PAUSE
FORWARD SKIP
FLT
BACK
OPEN/CLOSE
CODE NO. : A-141-10524A
STOP

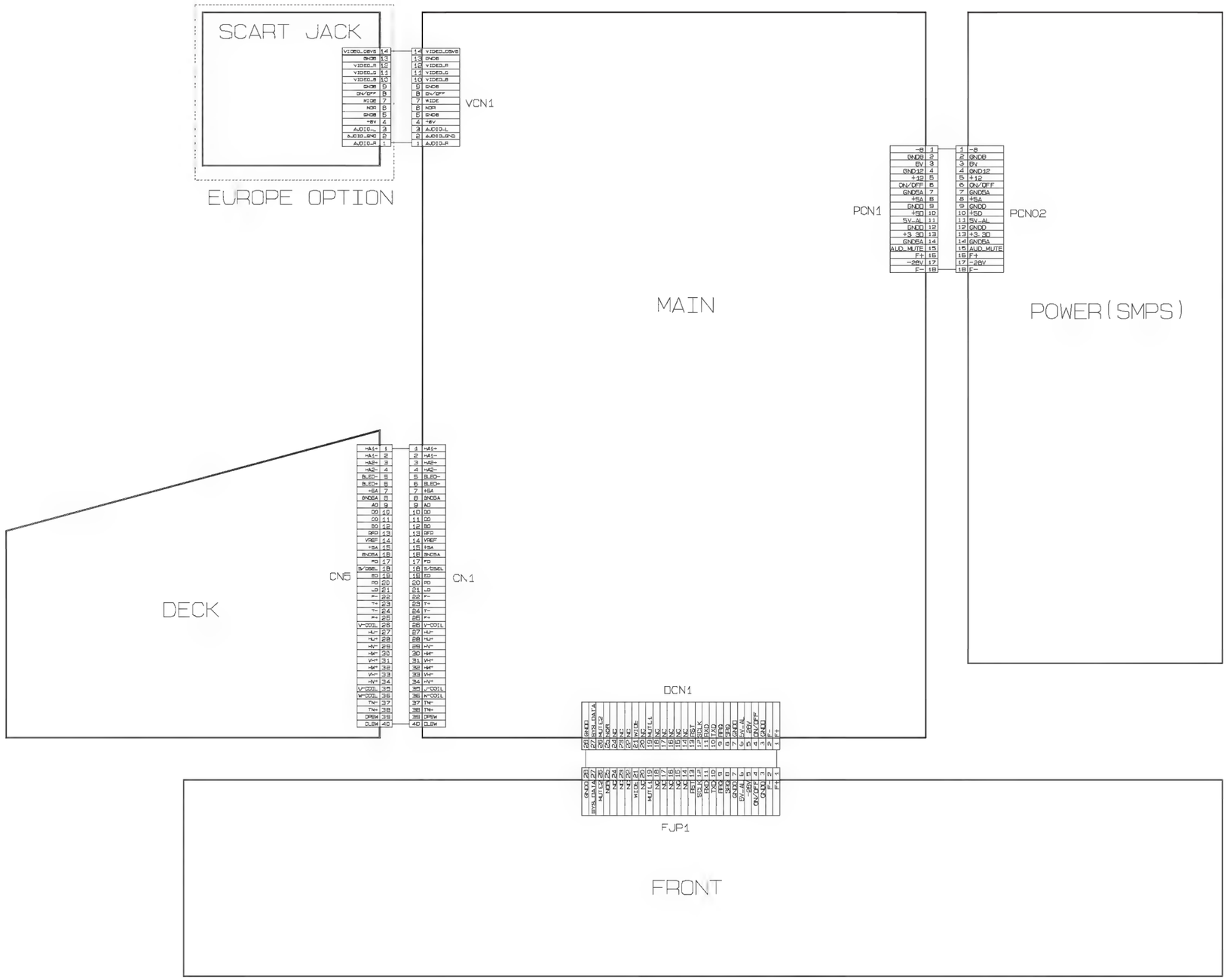

DVD-905 FRONT
RED
POWER
FSW7
FSW3
FLT
FSW4
PLAY/PAUSE
FSW6
FORWARD SKIP
GREEN
FSW5
BACK
FSW2
OPEN/CLOSE
FSW1
STOP
FLT
980403 REV 2
CODE NO.: AH41-10512A


SMPS DVD-927/907 REV:01
DANGER PART
RISK OF FIRE REPLACE FUSE AS MARKED
DIP
FT1
E2821-0927/907
FL-
FL+
-28V
3.3V
GND
5.8V
8V
GND
-8V
PCN92
PCN01
PVA1
PVA2
PL01
PL02
PRI
OPTION
WHITE/BLUE
BLACK/BROWN


A
B
C
D
E
F
4
3
2
1
0
CN5
CN1
CN3
CN4
CN2
DC1
DC2
DC3
DC4
DC5
DC6
DC7
DL1
DJ4
DJ5
DJ6
DJ7
DJ8
DJ9
DJ10
DJ11
DJ12
DJ13
DJ14
DJ15
DJ17
DJ18
DJ19
DJ20
DJ21
SW1
SW2
SW3
LD
CLOSE
OPEN
GND
DP-2 (DVD905)
DECK PCB
REV-NO : 0
CODE NO : AH41-10559A


2 4 6 8 10 12 14 16 18 20
1 3 5 7 9 11 13 15 17 19 21
ECN2
G/JACK1
G/JACK2
CVBS
R
G
B
ON/OFF
ED3
ER8
ER7
EQ2
ER3
EQ1
ER4
EQ4
ER1
EQ3
ER6
EQ5
C945-Y
ER5
R2001
R1003
R2001
R1003
SCJ1
ED2
ED1
SCJ2
AU L
AU R
EC3
EC2
EIC2
EC1
ECN1
MODEL : DVD-907
CODE NO.:AH41-1057A
VER NO.:0
PCB SCART

14. Wiring Diagram



15. Schematic Diagrams

15-1 MAIN Rev.1

15-1-1 MICOM

15-1-2 SERVO

15-1-3 DATA PROCESSOR

15-1-4 A/V DECODER

15-1-5 AUDIO

15-1-6 VIDEO

15-1-7 CONNECTOR

15-2 Front

15-2-1 DVD-907

15-2-2 DVD-927

15-3 SMPS

15-4 PICK-UP/DECK

15-5 MAIN Rev.2

15-5-1 MICOM

15-5-2 SERVO

15-5-3 DATA PROCESSOR

15-5-4 A/V DECODER

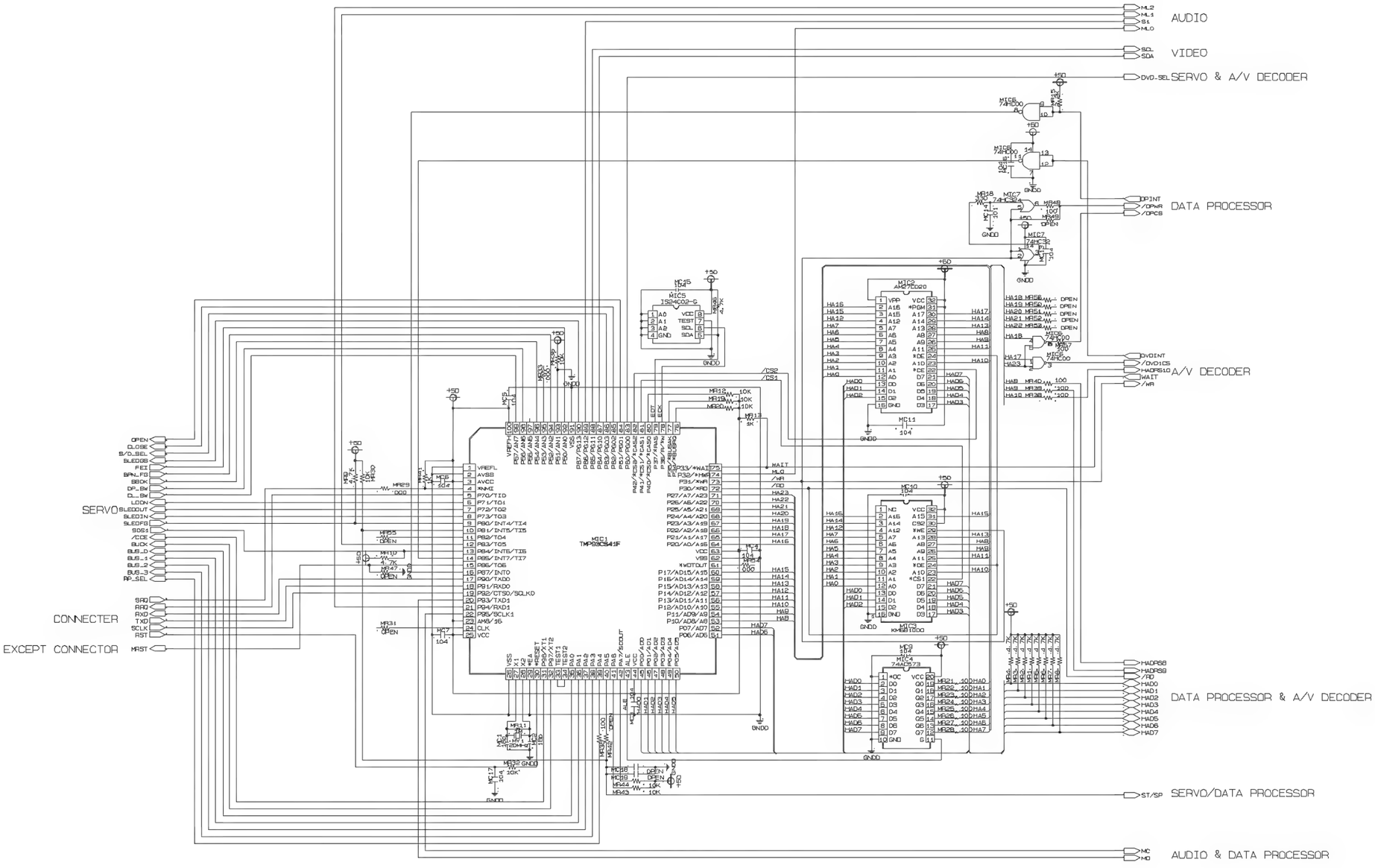
15-5-5 AUDIO

15-5-6 VIDEO

15-5-7 CONNECTOR

15-6 Scart Jack

15-1-1 MICOM


AUDIO
VIDEO
SERVO & A/V DECODER
DATA PROCESSOR
A/V DECODER
DATA PROCESSOR & A/V DECODER
SERVO/DATA PROCESSOR
AUDIO & DATA PROCESSOR
SERVO
CONNECTER
EXCEPT CONNECTOR
MIC1 TMP93C641F
MIC2 74HC20
MIC3 K4S281000
MIC4 74AC573
MIC5 1S24C02-G
MIC6 74HC00
MIC7 74HC32
MIC8 74HC00
MIC9 74HC00
MIC10 74HC04
MIC11 104
MIC12 104
MIC13 104
MIC14 104
MIC15 104
MIC16 104
MIC17 104
MR1 1M
MR2 4.7K
MR3 4.7K
MR4 4.7K
MR5 4.7K
MR6 4.7K
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MR27 10
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MR29 100
MR30 100
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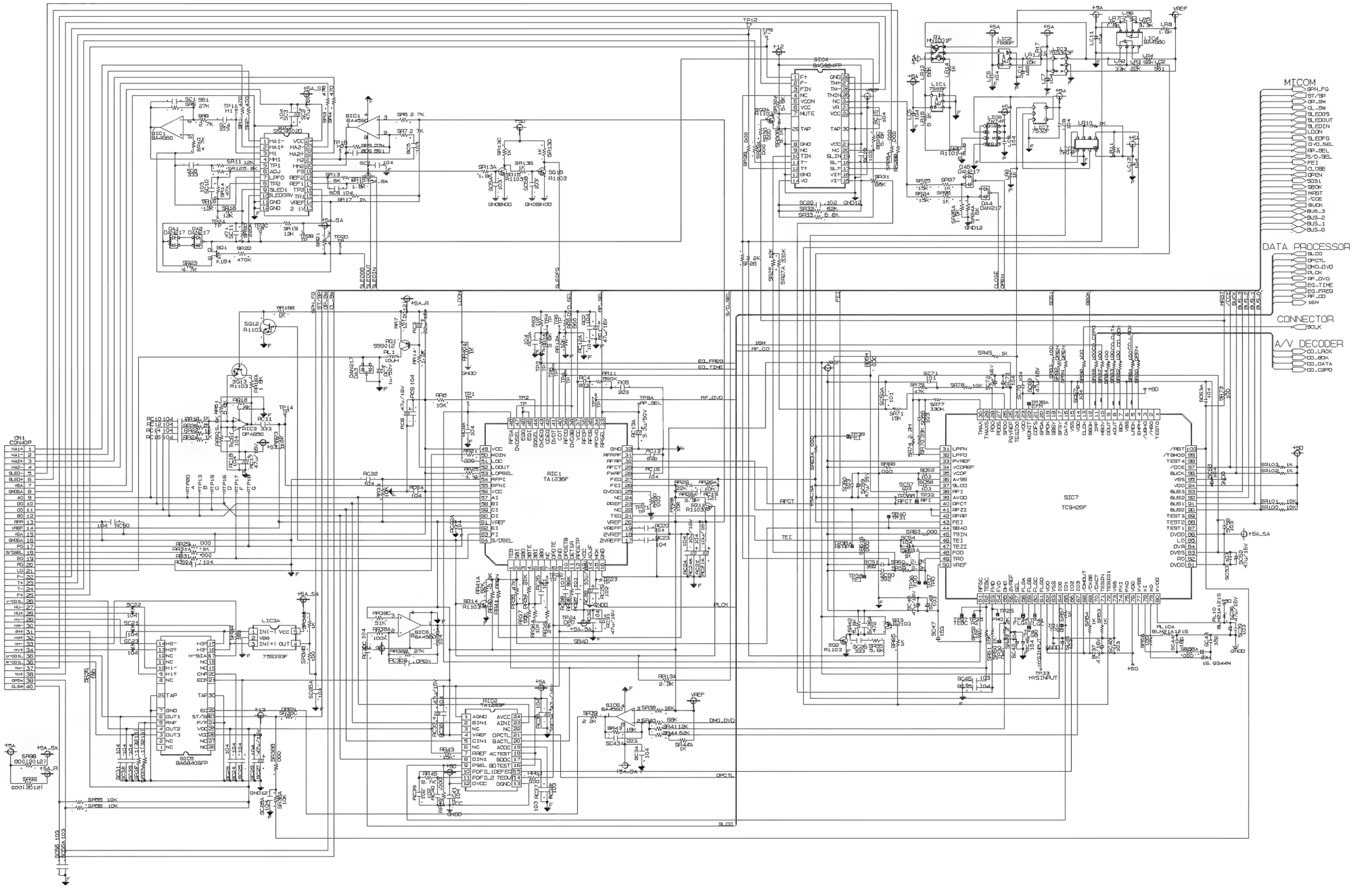
15-1-2 SERVO


MICOM
DATA PROCESSOR
CONNECTOR
A/V DECODER
SIC7
TC9420F
CON40P
SIC4
BA5850FP
SIC5
BA4560
SIC6
BA4580
SIC8
BA6848FP
RIC1
TA1236F
RIC2
TA1285F
RIC3
BA4560
RIC4
BA4560
RIC5
BA4560
RIC6
BA4560
LIC3A
75393F
SIC9
BA6208AFP
SIC10
BA6218AFP
SIC11
BA6218AFP
SIC12
BA6218AFP
SIC13
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SIC14
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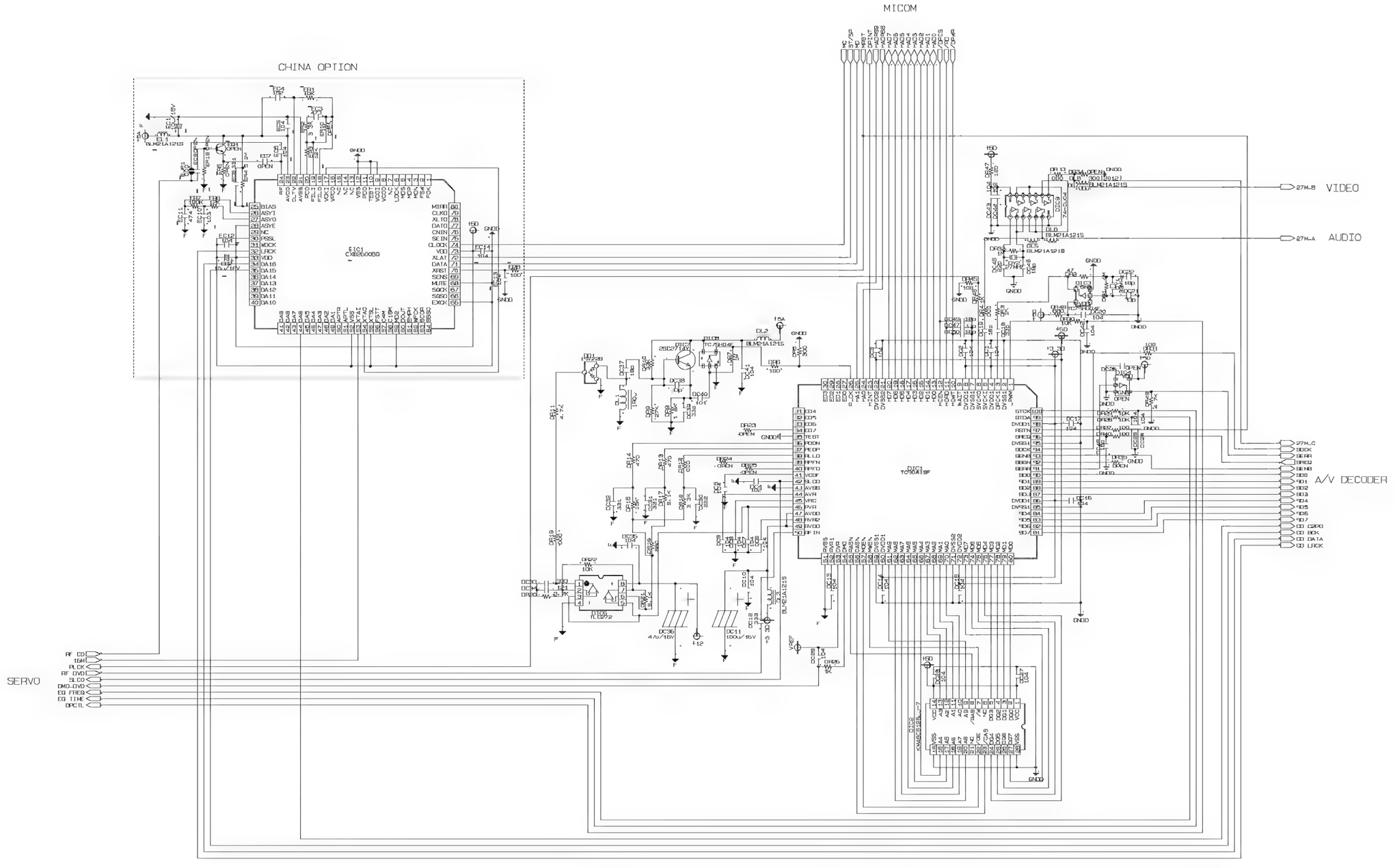
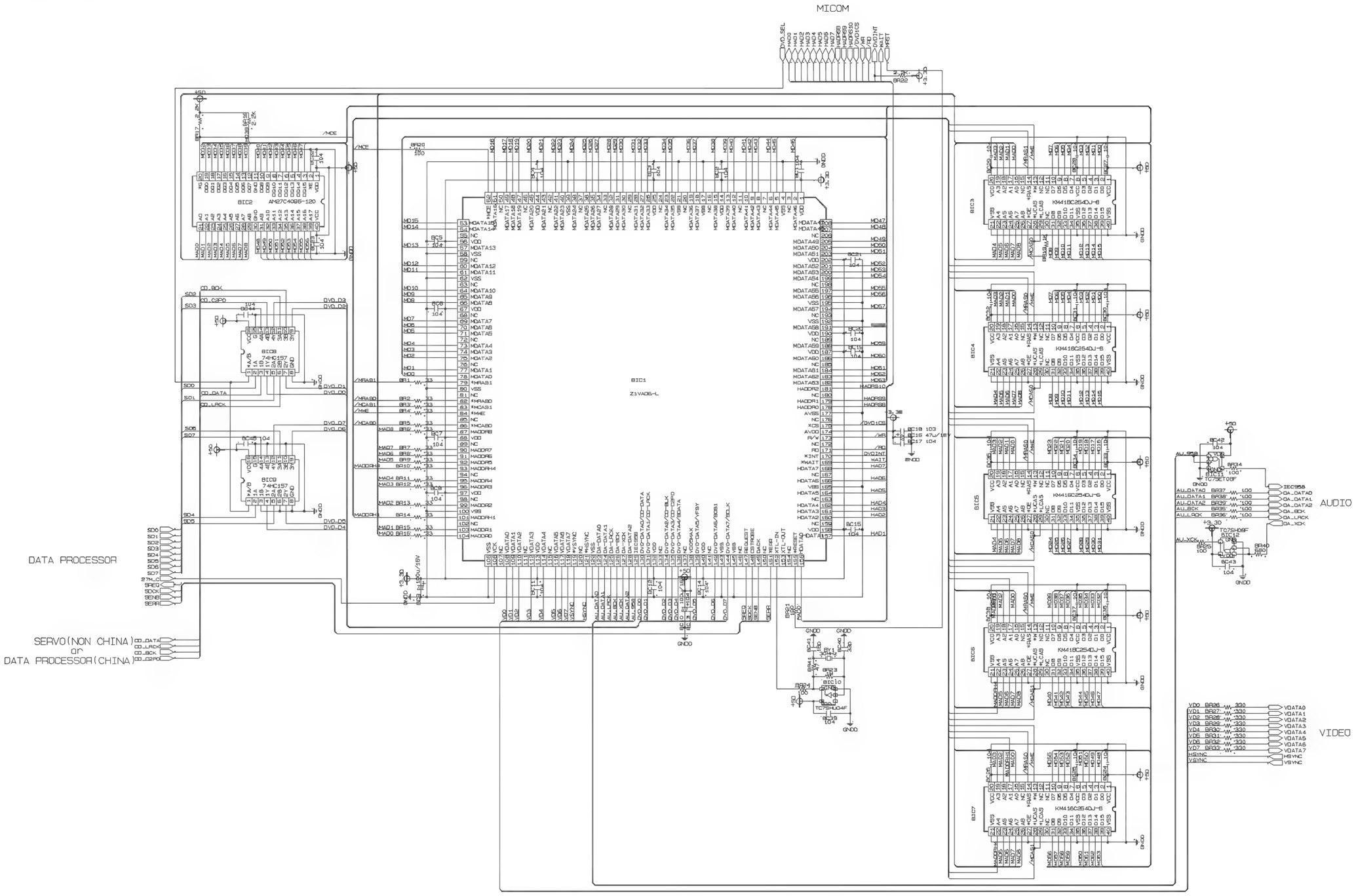
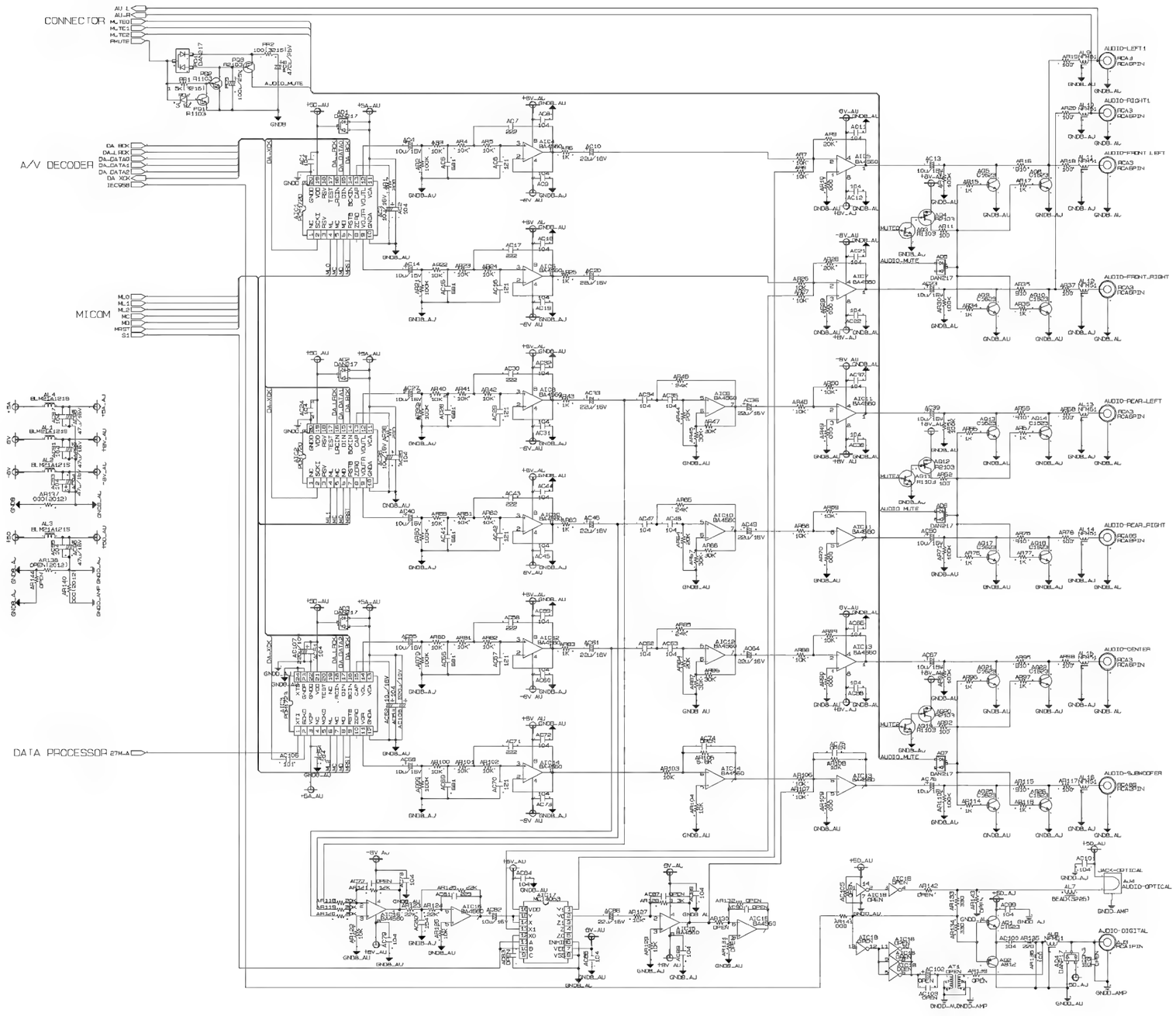
15-1-3 DATA PROCESSOR



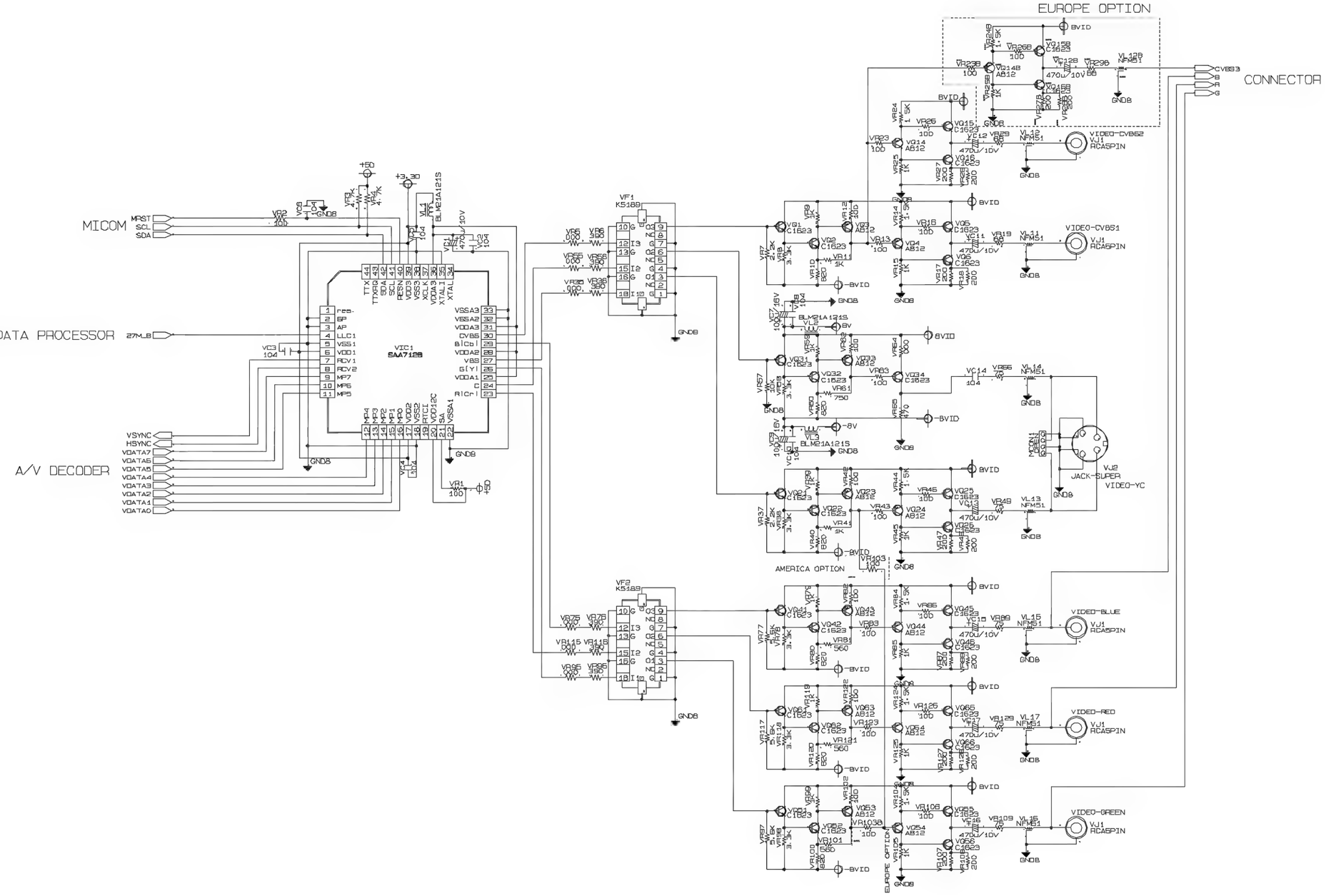
15-1-4 A/V DECODER



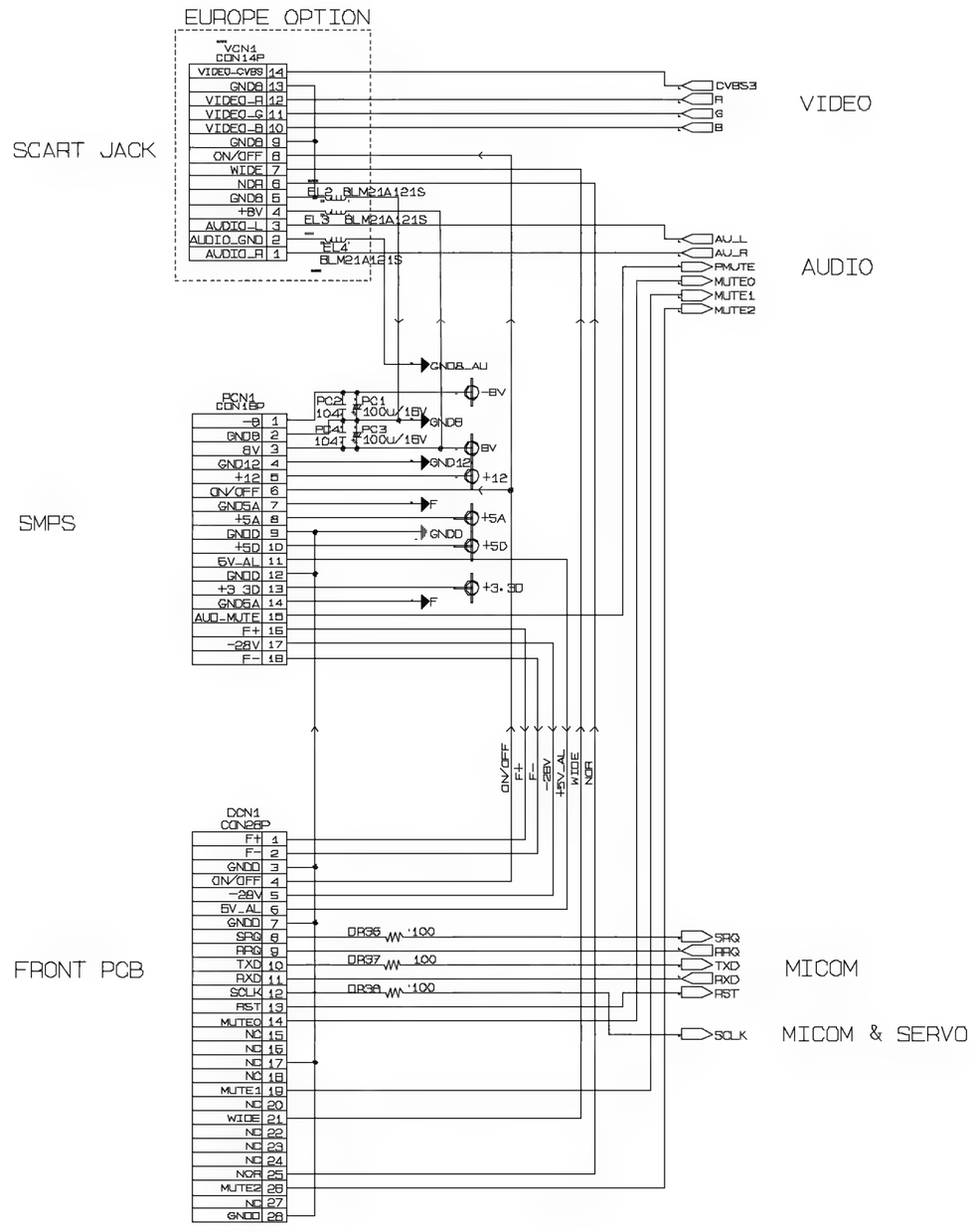
15-1-5 AUDIO


CONNECTOR
A/V DECODER
MICOM
DATA PROCESSOR
AUDIO-LEFT1
AUDIO-RIGHT1
AUDIO-FRONT LEFT
AUDIO-FRONT_RIGHT
AUDIO-REAR_LEFT
AUDIO-REAR_RIGHT
AUDIO-CENTER
AUDIO-SUBWOOFER
AUDIO-OPTICAL
AUDIO-DIGITAL
AUDIO_MUTE

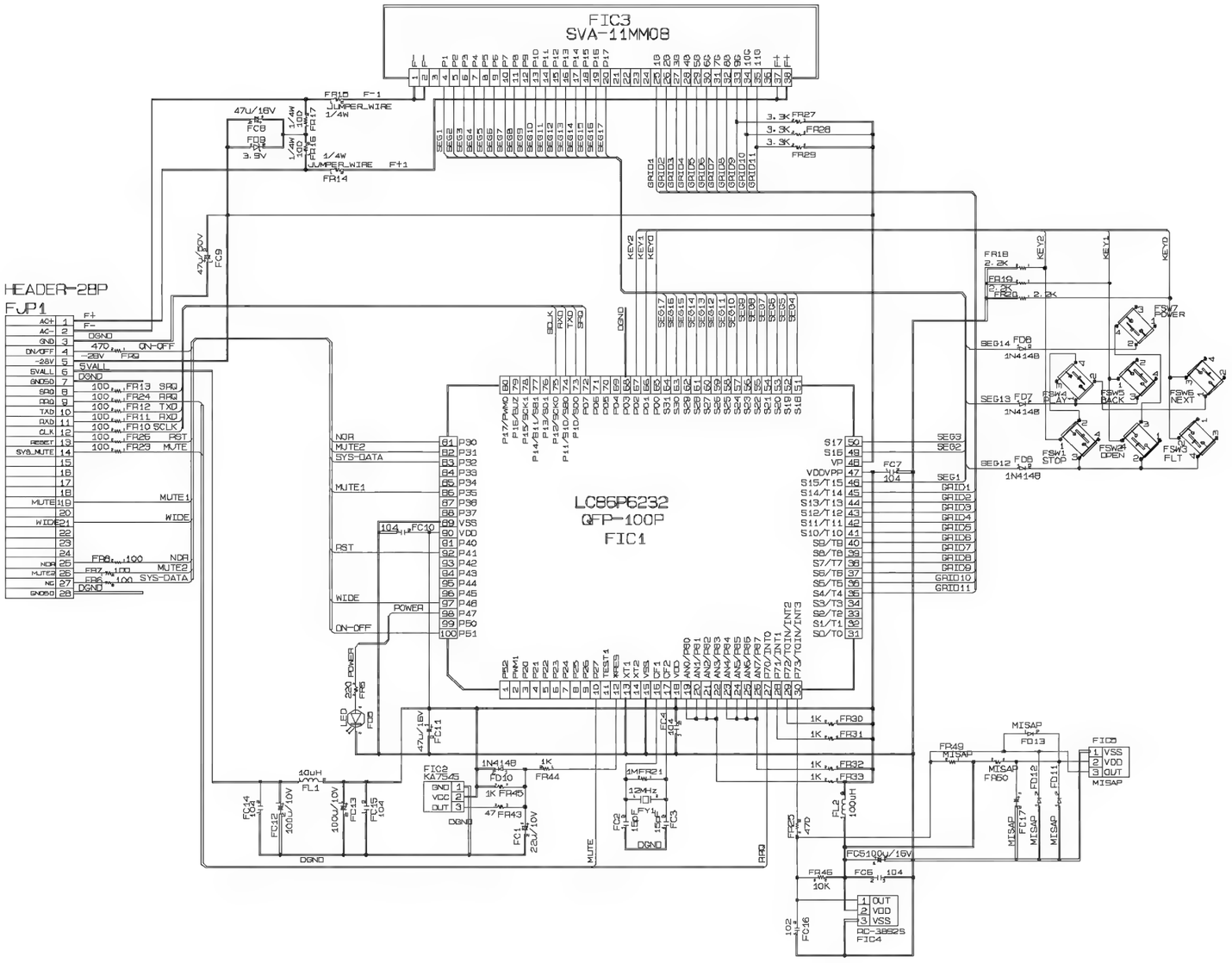
15-1-6 VIDEO


EUROPE OPTION
AMERICA OPTION
CONNECTOR
MICOM
DATA PROCESSOR
A/V DECODER
VIC1
SAA7128
VF1
K5189
VF2
K5189
VJ1
RCASPIN
VJ2
JACK-SUPER
VIDEO-CVBS2
VIDEO-CVBS1
VIDEO-BLUE
VIDEO-RED
VIDEO-GREEN
VIDEO-YC
BVID
GND8

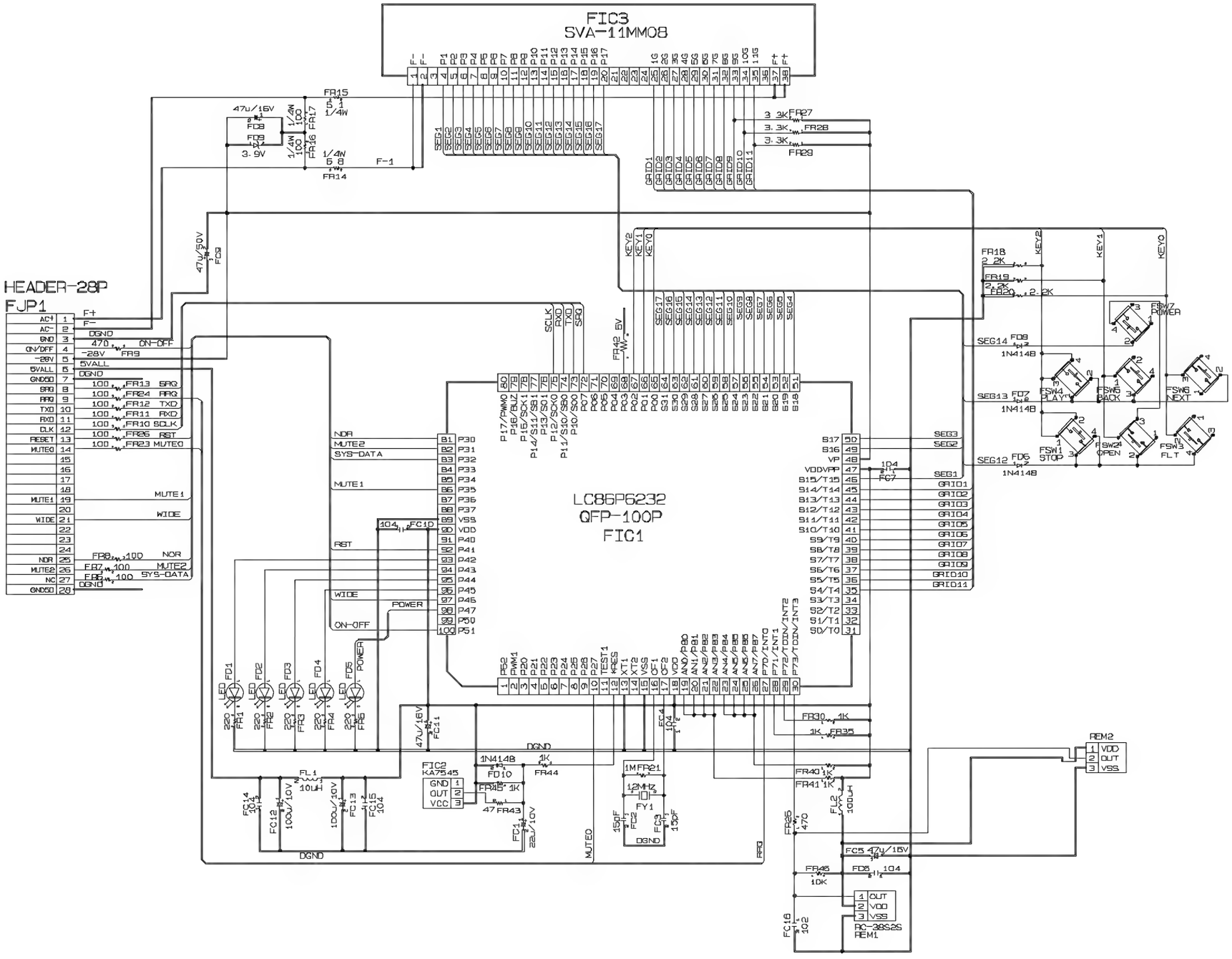
15-1-7 CONNECTOR

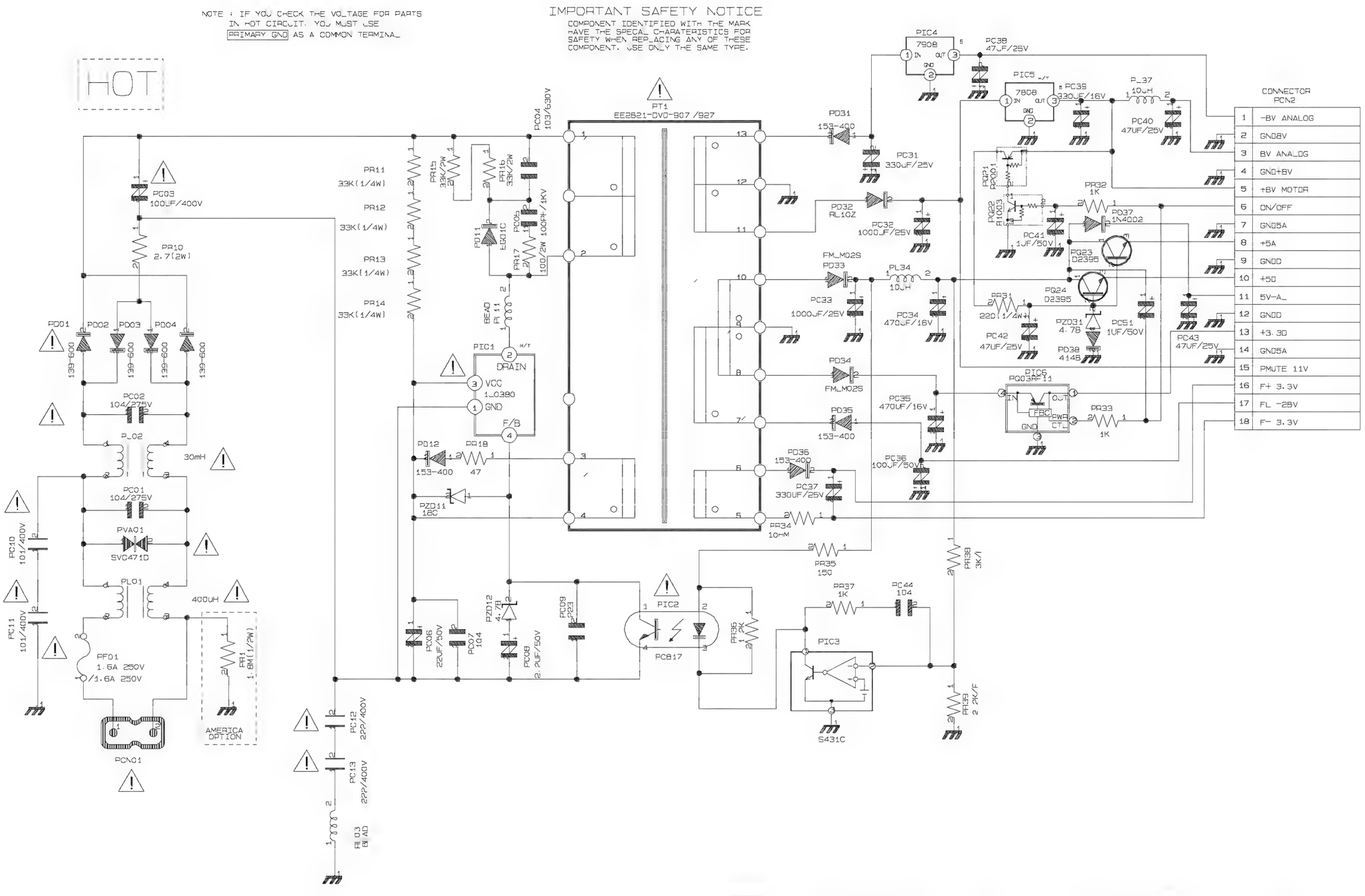


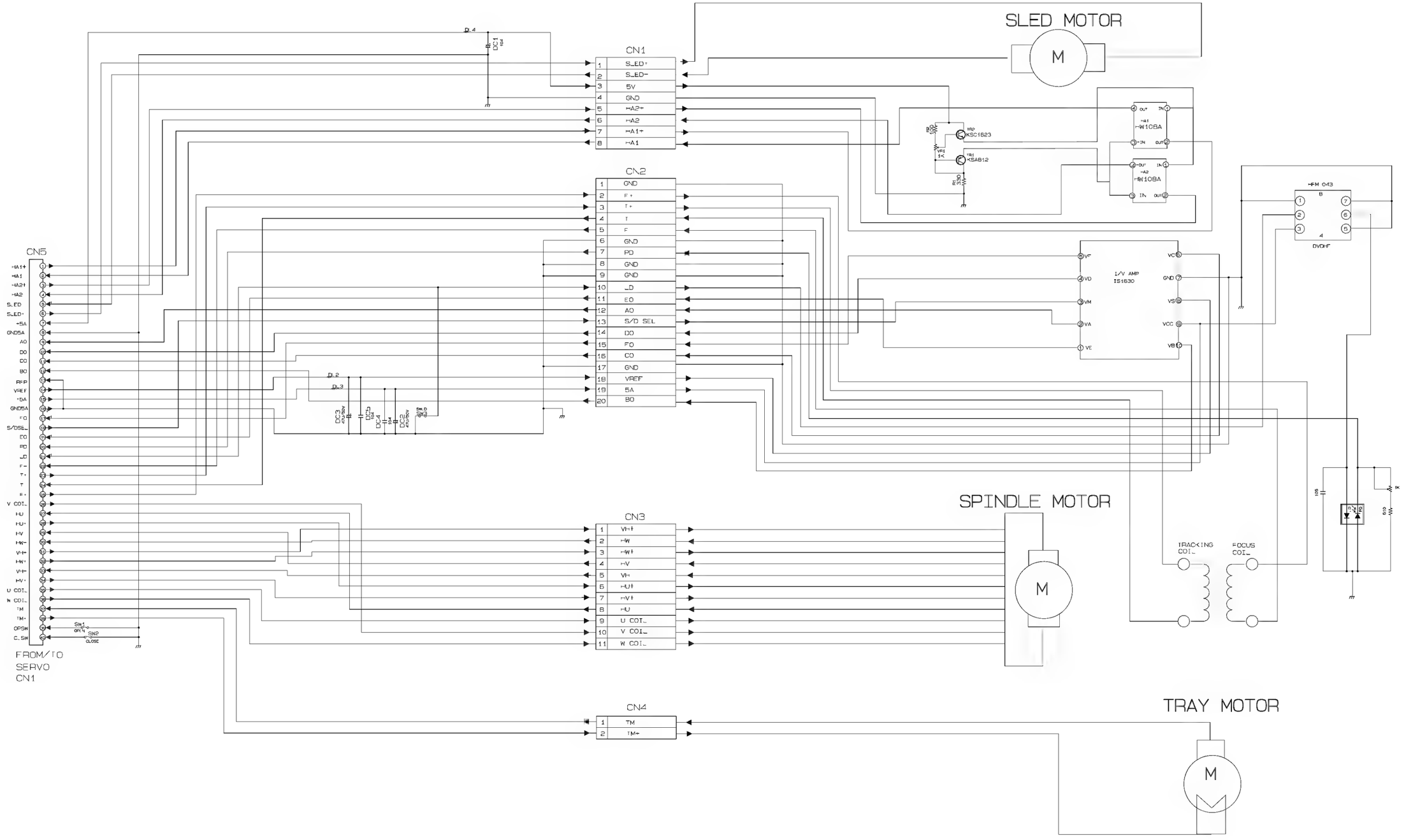
15-2-1 DVD-907


FIC3
SVA-11MM08
HEADER-28P
FJP1
LC86P6232
QFP-100P
FIC1
FIC2
KA7545
FIC4
DC-3962S
FIC5
FSW1 STOP
FSW2 OPEN
FSW3 FLT
FSW4 A-Y
FSW5 BACK
FSW6 NEXT
FSW7 POWER
DGND
MUTE
ARQ

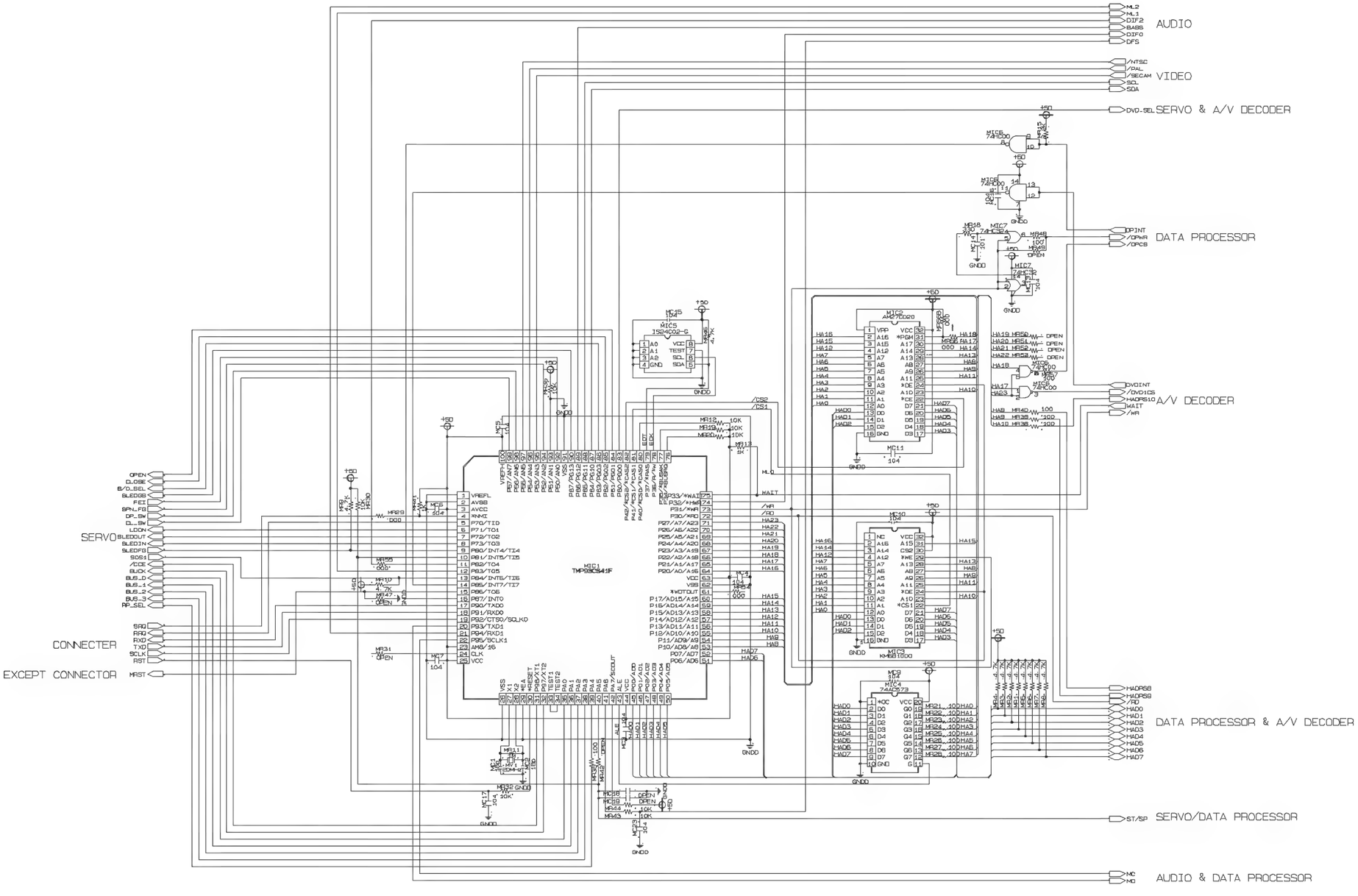
15-2-2 DVD-927


FIC3
SVA-11MM08
HEADER-28P
FJP1
LC86P6232
QFP-100P
FIC1
FIC2
KA7545
REM1
REM2
FSW1 STOP
FSW2 OPEN
FSW3 FLT
FSW4 PLAY
FSW5 BACK
FSW6 NEXT
FSW7 POWER
MUTE1
MUTE2
WIDE
POWER
ON-OFF
SYS-DATA
NOR
MUTEO
DGND


NOTE : IF YOU CHECK THE VOLTAGE FOR PARTS IN HOT CIRCUIT. YOU MUST USE PRIMARY GND AS A COMMON TERMINAL
IMPORTANT SAFETY NOTICE
COMPONENT IDENTIFIED WITH THE MARK HAVE THE SPECIAL CHARATERISTICS FOR SAFETY WHEN REPLACING ANY OF THESE COMPONENT. USE ONLY THE SAME TYPE.
HOT
PT1
EE2821-DV0-907/927
PC04 103/630V
PR11 33K(1/4W)
PR12 33K(1/4W)
PR13 33K(1/4W)
PR14 33K(1/4W)
PR15a 33K/2W
PR15b 33K/2W
PC03 100UF/400V
PR10 2.7(2W)
PD11 EG01C
PC05
PR17 100/2W
BEAD FI 11
PD01 PD02 PD03 PD04 139-600
PC02 104/275V
P_02 30mH
PC01 104/275V
PVA01 SVC471D
PC10 101/400V
PC11 101/400V
PL01 400UH
PF01 1.6A 250V /1.6A 250V
PR1 1.8M(1/2W)
AMERICA OPTION
PCN01
PIC1 H/T
DRAIN
VCC
GND
F/B
1_0380
PD12 153-400
PR18 47
PZD11 18C
PC06 22UF/50V
PC07 104
PZD12 4.7B
PC08 2.2UF/50V
PC09 223
PIC2 PC817
PR36 2K
PC12 222/400V
PC13 222/400V
RL03 BEAD
PIC4 7908
PC38 47UF/25V
PIC5 7808
PC39 330UF/16V
P_37 10uH
PC40 47UF/25V
PD31 153-400
PC31 330UF/25V
PD32 RL10Z
PC32 1000UF/25V
FM_M02S
PD33
PC33 1000UF/25V
PL34 10uH
PC34 470UF/16V
PD34 FM_M02S
PC35 470UF/16V
PD35 153-400
PD36 153-400
PC37 330UF/25V
PR34 10-M
PC36 100UF/50V
PR35 150
PQR21 PQ001
PQ22 R1005
PR32 1K
PD37 1N4002
PC41 1UF/50V
PQ23 D2395
PQ24 D2395
PR31 220 1/4W
PZD31 4.7B
PD38 4148
PC51 1UF/50V
PC42 47UF/25V
PC43 47UF/25V
PIC6 PQ03RF11
FBC
PWR
CTL
PR33 1K
PC44 104
PR37 1K
PIC3 S431C
PR38 3K/1
PR39 2.2K/F
CONNECTOR PCN2
1 -8V ANALOG
2 GND8V
3 8V ANALOG
4 GND+8V
5 +8V MOTOR
6 ON/OFF
7 GND5A
8 +5A
9 GND
10 +5D
11 5V-A_
12 GND
13 +3.3D
14 GND5A
15 PMUTE 11V
16 F+ 3.3V
17 FL -28V
18 F- 3.3V


SLED MOTOR
M
CN1
1 SLED+
2 SLED-
3 5V
4 GND
5 +A2+
6 +A2
7 +A1+
8 +A1
CN2
1 GND
2 F+
3 T+
4 T
5 F
6 GND
7 PD
8 GND
9 GND
10 LD
11 EO
12 AO
13 S/D SEL
14 DO
15 FO
16 CO
17 GND
18 VREF
19 5A
20 BO
CN5
+A1+
+A1
+A2+
+A2
SLED
SLED+
+5A
GND5A
AO
DO
CO
BO
RF-P
VREF
+5A
GND5A
FO
S/DSEL
EO
PD
LD
T-
T+
T
F+
V COIL
+U
+U-
+V
+W-
W+
W+
+V-
U COIL
W COIL
TM
TM+
OPSW
C_SW
SW1 OPEN
SW2 CLOSE
FROM/TO SERVO CN1
CN3
1 W+
2 +W
3 +W+
4 +V
5 V+
6 +U+
7 +V+
8 +U
9 U COIL
10 V COIL
11 W COIL
SPINDLE MOTOR
M
CN4
1 TM
2 TM+
TRAY MOTOR
M
TRACKING COIL
FOCUS COIL
1/V AMP IS1630
VF
VD
VM
VA
VE
VC
GND
VS
VCC
VB
DVDHF
KSC1623
KSA812
+W10SA
+W10SA

15-5-1 MICOM


AUDIO
VIDEO
SERVO & A/V DECODER
DATA PROCESSOR
A/V DECODER
DATA PROCESSOR & A/V DECODER
SERVO/DATA PROCESSOR
AUDIO & DATA PROCESSOR
SERVO
CONNECTER
EXCEPT CONNECTOR
MIC1 TMP88C841F
MIC2 AM27D020
MIC3 KM681000
MIC4 74AC573
MIC5 15C4402-S
MIC6 74HC00
MIC7 74HC32
MIC8 74HC00
MIC9 74HC00
MIC10 74HC04
MIC11 104
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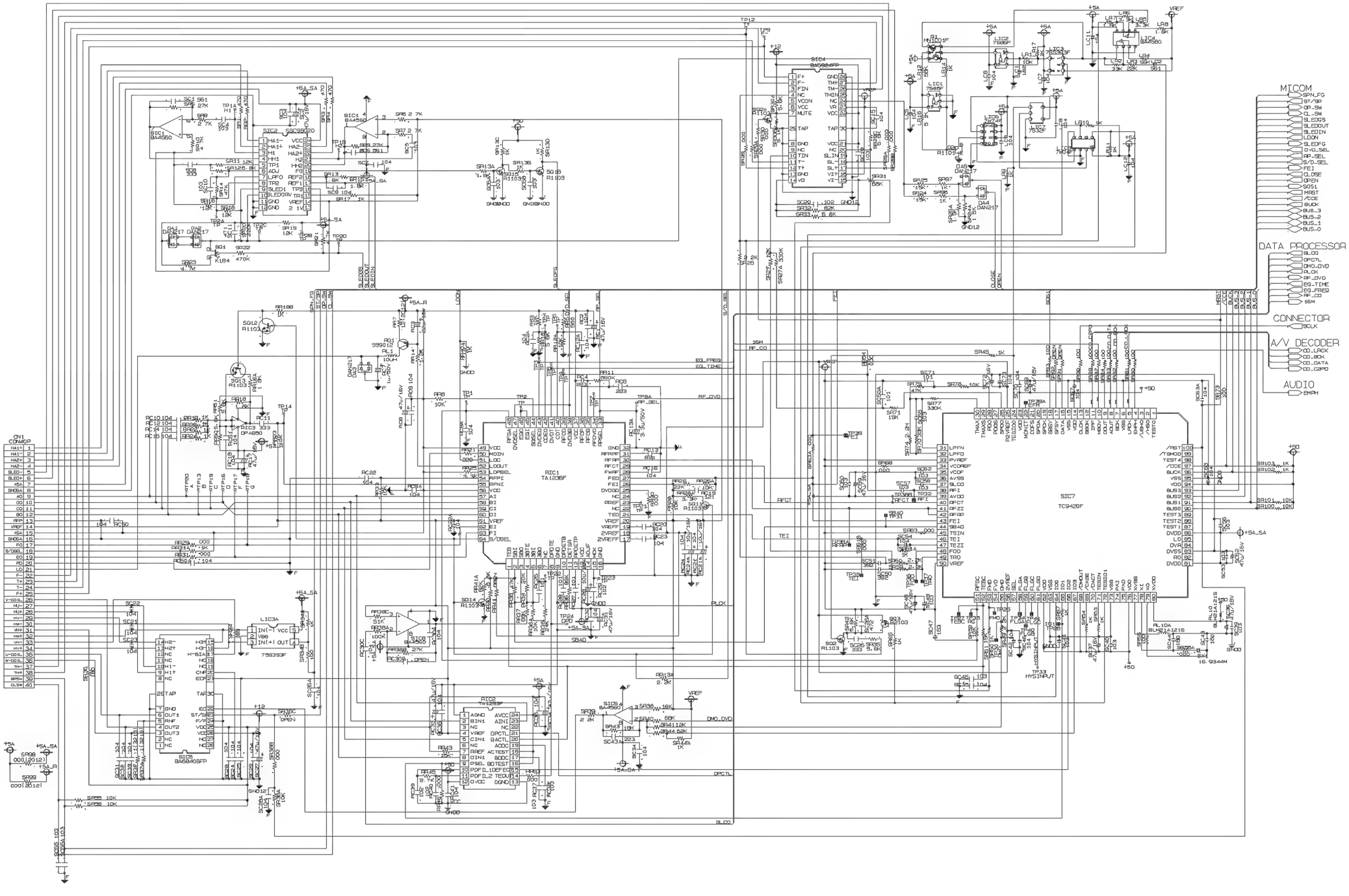
15-5-2 SERVO


MICOM
DATA PROCESSOR
CONNECTOR
A/V DECODER
AUDIO
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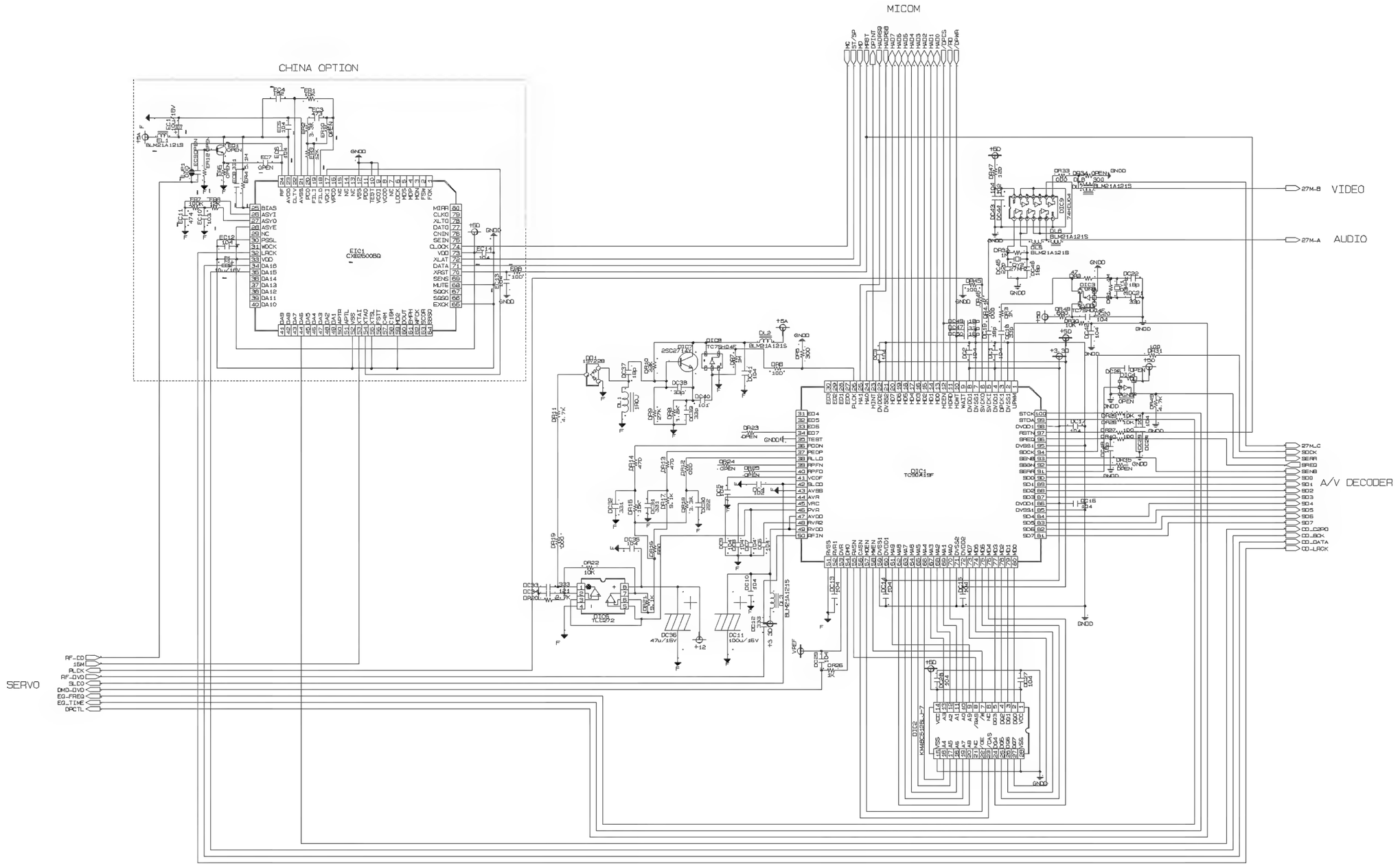
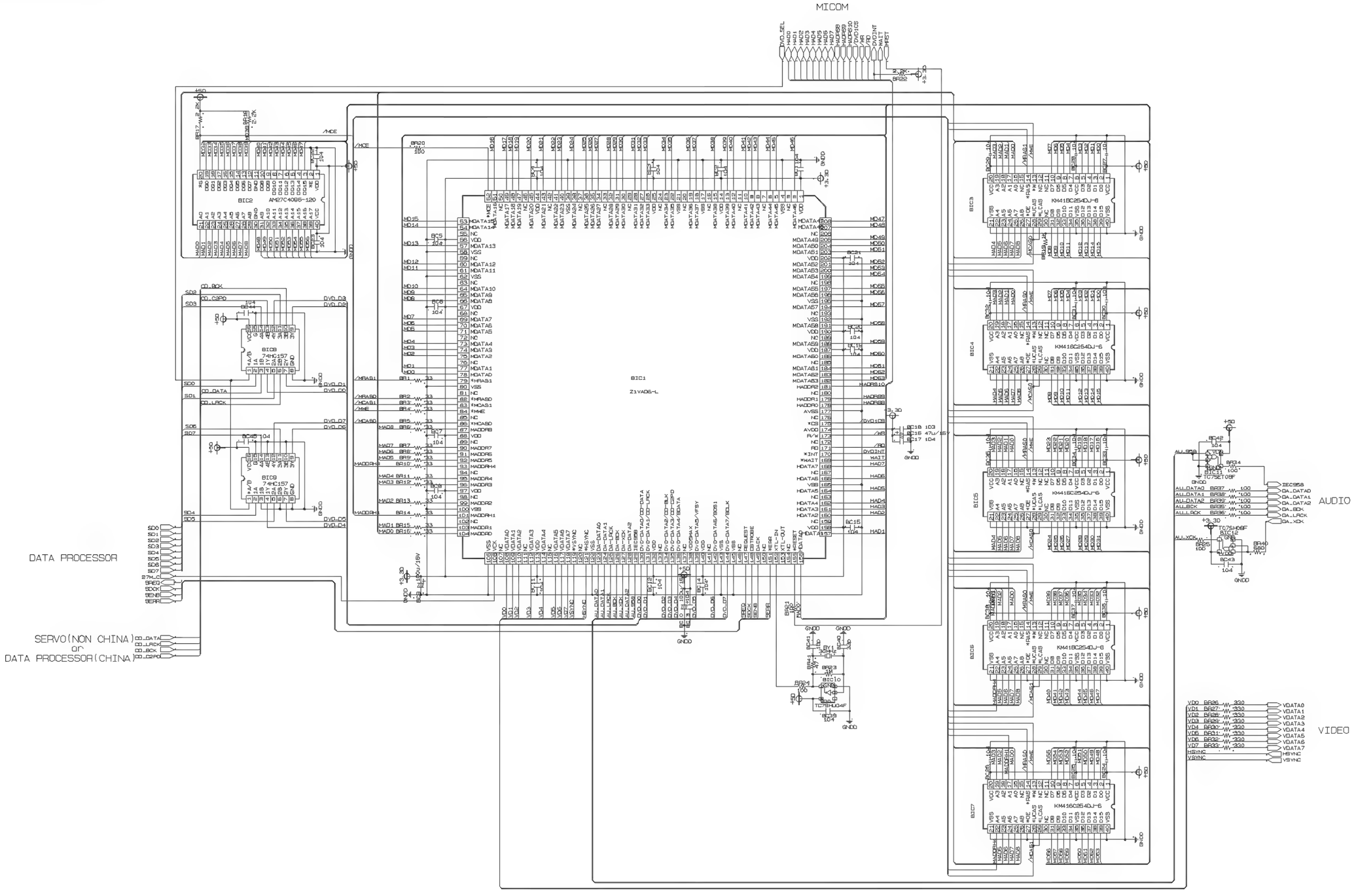
TC9420F
RIC1
TA1236F
RIC2
TA1285F
SIC4
BA5834FP
SIC2
SSC9350
LIC3A
75393F
SIC5
BA6208FP

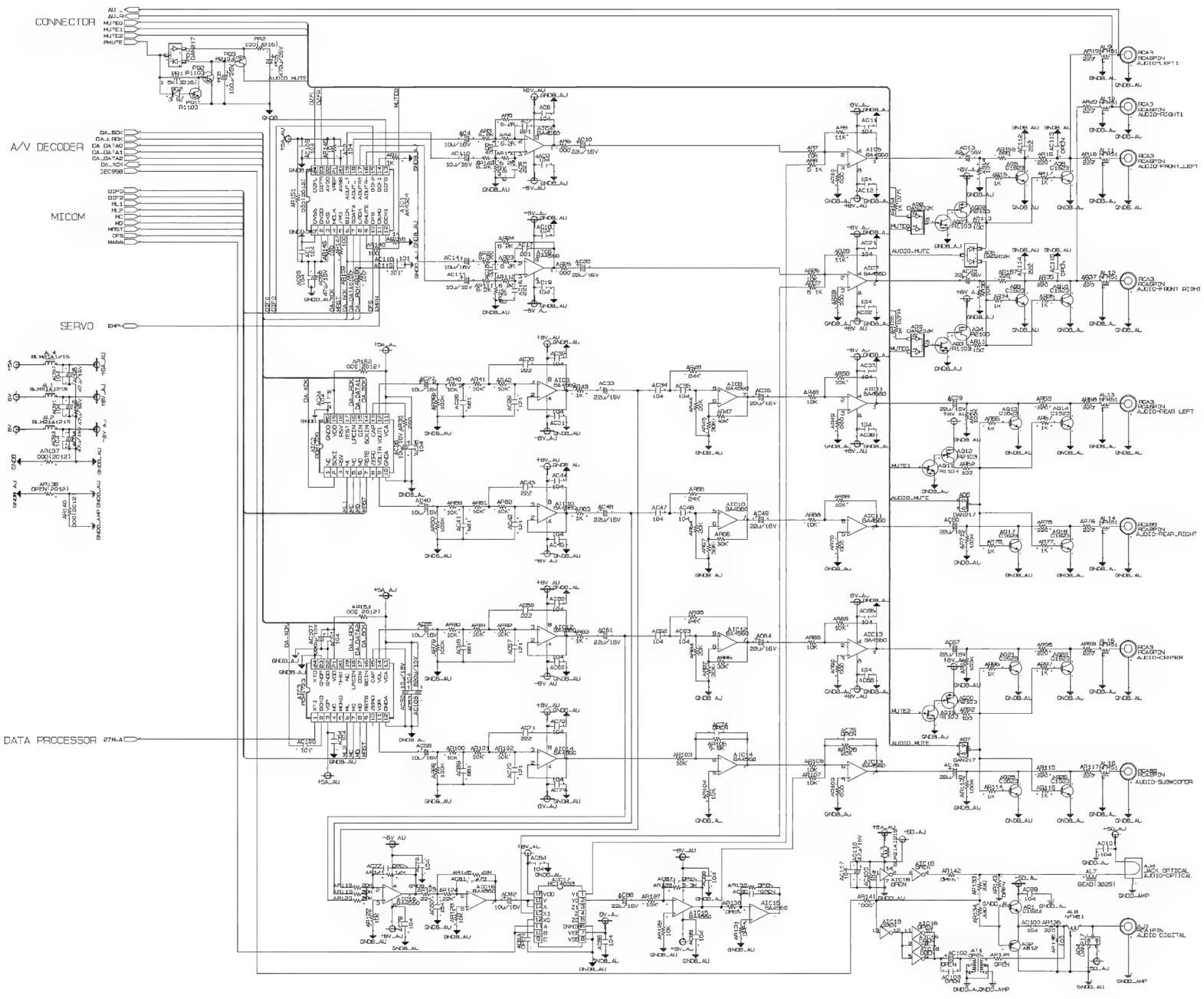
15-5-3 DATA PROCESSOR



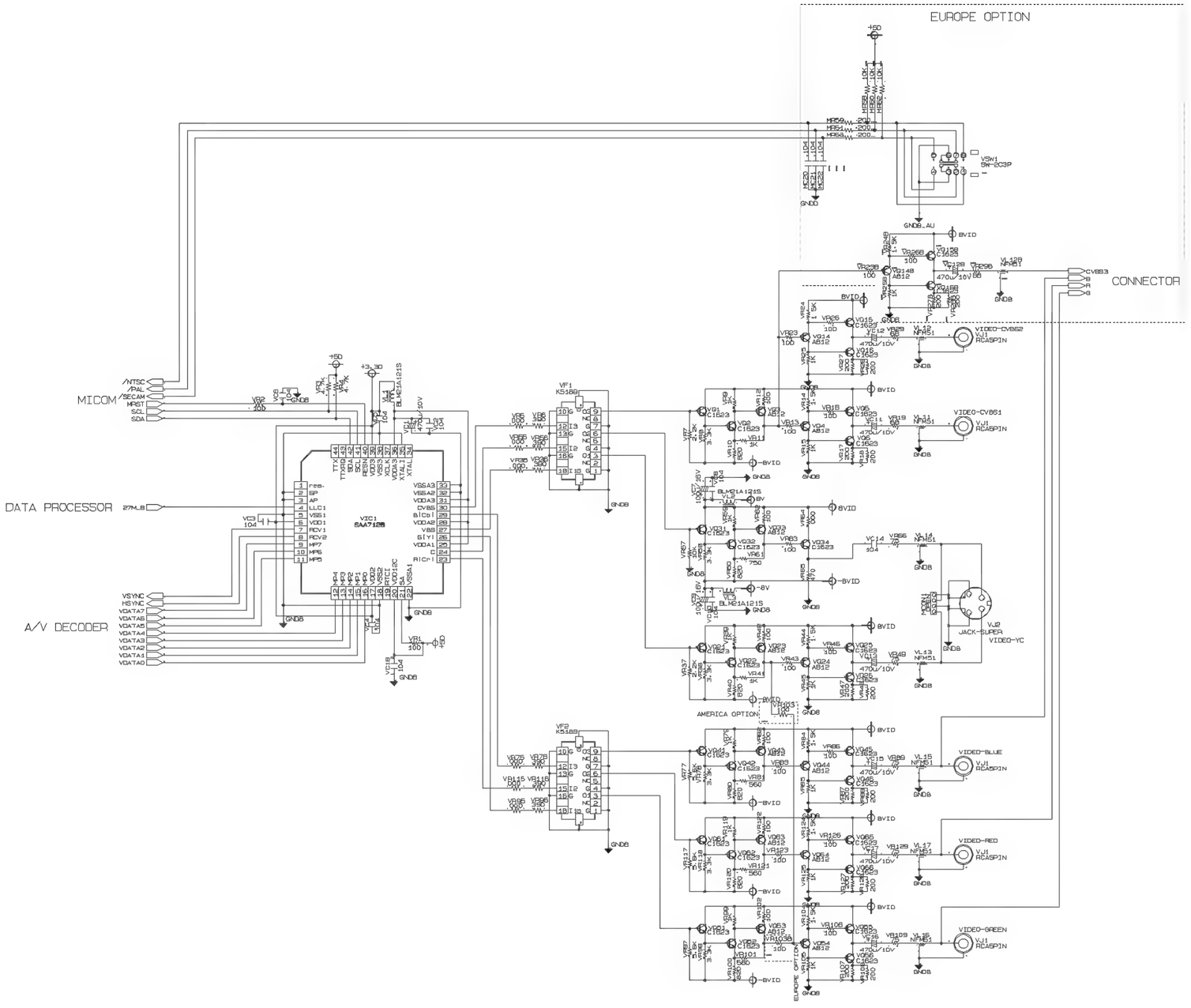
15-5-4 A/V DECODER



15-5-5 AUDIO


CONNECTOR
A/V DECODER
MICOM
SERVO
DATA PROCESSOR
AUDIO_MUTE
RCA3 RCA8PIN AUDIO-FRONT_LEFT
RCA3 RCA8PIN AUDIO-FRONT_RIGHT
RCA3 RCA8PIN AUDIO-CENTER
RCA3 RCA8PIN AUDIO-REAR_LEFT
RCA3 RCA8PIN AUDIO-REAR_RIGHT
RCA3 RCA8PIN AUDIO-SUBWOOFER
JACK OPTICAL AUDIO-OPTICAL
RCA3 RCA8PIN AUDIO-DIGITAL

15-5-6 VIDEO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CONNECTOR
AMERICA OPTION
MICOM
/NTSC
/PAL
/SECAM
MRST
SCL
SDA
DATA PROCESSOR
27M_IB
A/V DECODER
VSYNC
HSYNC
VDATA7
VDATA6
VDATA5
VDATA4
VDATA3
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VDATA0
VIC1
SAA7128
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K5169
VF2
K5169
+5D
+3.3D
+8V
-8V
GNDB
GNDB_AU
BVID
VIDEO-CVBS2
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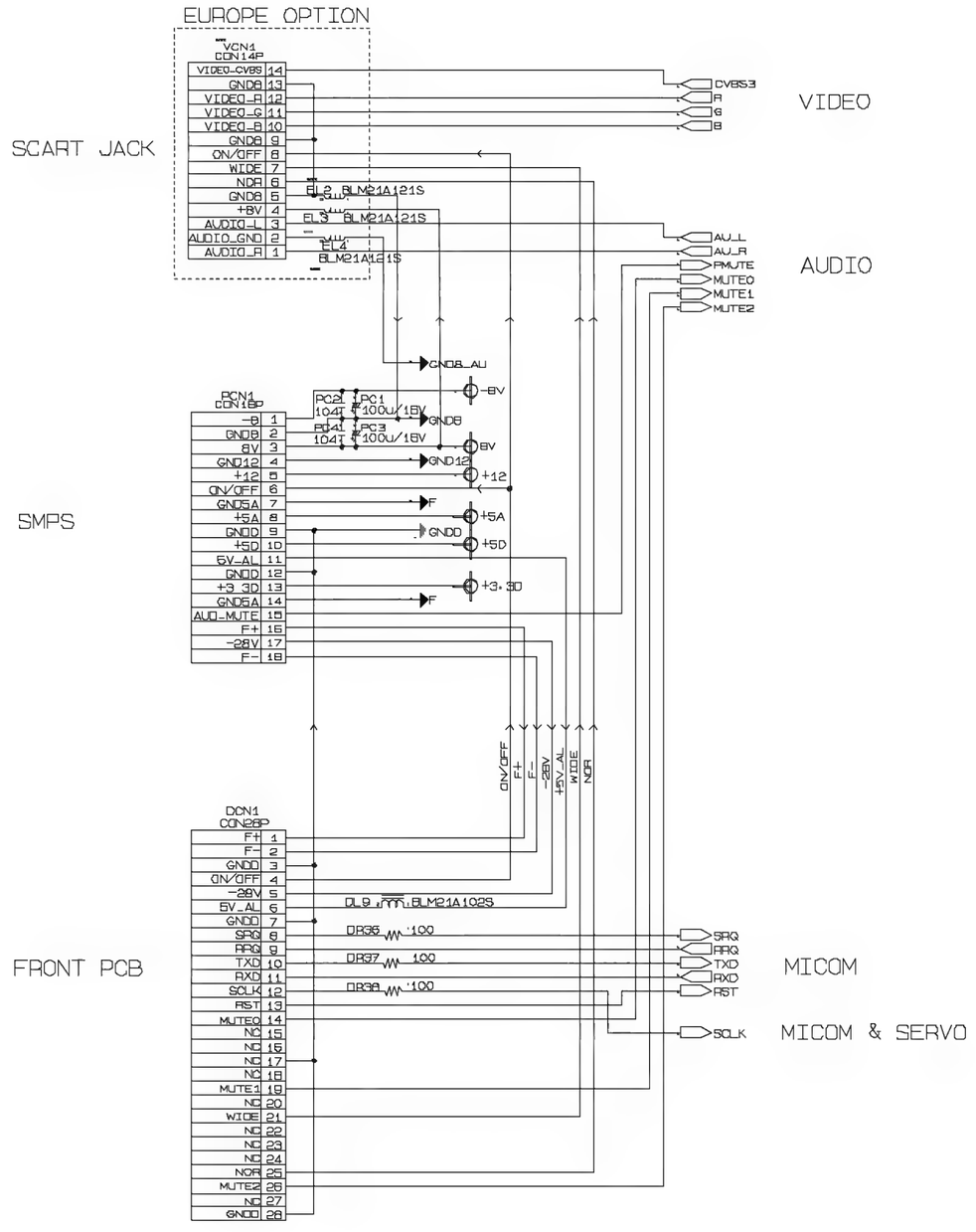
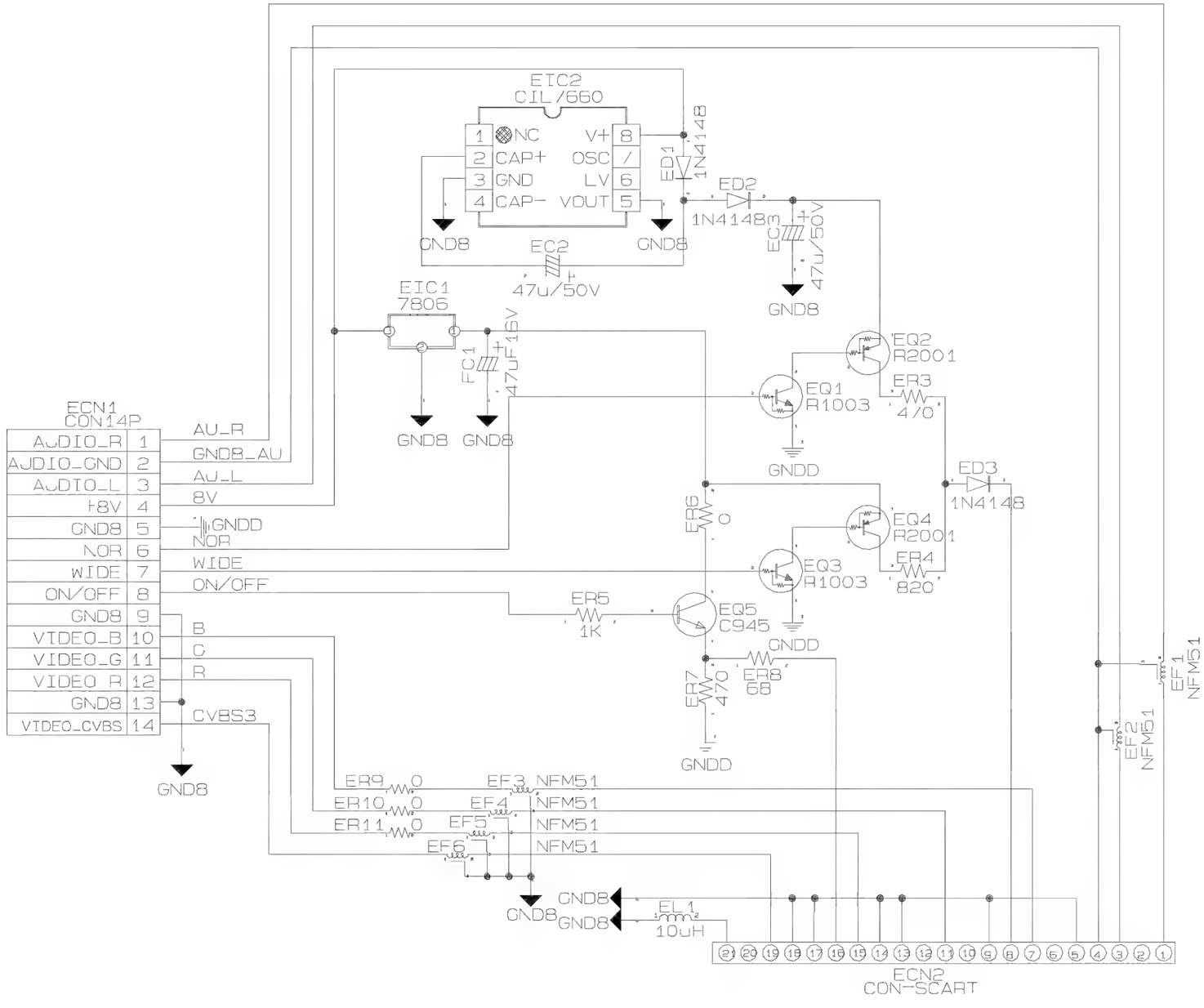
VIDEO-RED
VIDEO-GREEN
VIDEO-YC
JACK-SUPER
RCASPIN
CVBS3

15-5-7 CONNCTOR

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3 GND
4 CAP-
V+ 8
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LV 6
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ED2 1N4148m
EC1 47u/50V
EC2 47u/50V
GND8
EIC1 7806
FC1 47uF16V
EQ2 R2001
EQ1 R1003
ER3 4/0
GNDD
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ER6 0
EQ4 R2001
EQ3 R1003
ER4 820
ER5 1K
EQ5 C945
ER7 470
ER8 68
ECN1 CON14P
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VIDEO_R 12
GND8 13
VIDEO_CVBS 14
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ER10 0
ER11 0
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EF6 NFM51
EF1 NFM51
EF2 NFM51
EL1 10uH
ECN2
CON-SCART

DVD: диски, проигрыватели, рекордеры.

Что такое DVD?

После долгого периода времени, потраченного на планирование и разработки, увидел свет новый формат, которого все так ждали. Появление формата DVD ознаменовало собой переход на новый, более продвинутый, уровень в области хранения и использования данных, звука и видео.

Первоначально аббревиатура DVD расшифровывалась, как digital video disc, это оптические диски с большой емкостью. Эти диски используются для хранения компьютерных программ и приложений, а так же полнометражных фильмов и высококачественного звука. Поэтому, появившаяся несколько позже расшифровка аббревиатуры DVD, как digital versatile disc, т.е. универсальный цифровой диск - более логична.

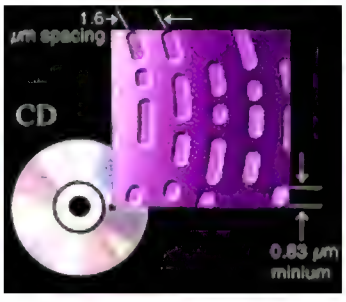
Снаружи, диски DVD выглядят как обычные диски CD-ROM. Однако возможностей у DVD гораздо больше. Диски DVD могут хранить в 26 раз больше данных, по сравнению с обычным CD-ROM. Имея физические размеры и внешний вид, как у обычного компакт-диска или CD-ROM, диски DVD стали огромным скачком в области емкости для хранения информации, по сравнению со своим предком, вмещающим 650MB данных. Стандартный однослойный, односторонний диск DVD может хранить 4.7GB данных. Но это не предел -- DVD могут изготавливаться по двухслойному стандарту, который позволяет увеличить емкость хранимых на одной стороне данных до 8.5GB. Кроме этого, диски DVD могут быть двухсторонними, что увеличивает емкость одного диска до 17GB. К несчастью, чтобы считать DVD диск, Вам придется купить новое устройство, но это новое аппаратное средство будет так же прекрасно считывать Ваши старые диски CD-ROM и звуковые CD. Что все это означает для нас большая емкость новых дисков? Это значит, что у нас появляются поистине неограниченные возможности для обучения и развлечений, для просмотра видеофильмов с потрясающим цифровым качеством изображения и звука. DVD обеспечивает более четкое и качественное изображение, чем лазерный дис (LD) и более насыщенный звук, чем на CD. Более того, DVD дает вам возможность выбора. Вы можете выбрать, с какого ракурса просматривать сцену фильма, благодаря тому, что одна и та же сцена снимается под разными углами положения камеры. Благодаря этому, один и тот же фильм можно смотреть, например, со сценами насилия или без них, а сюжет одного и того же фильма может причудливым образом изменяться. И почти все это уже имеется в продаже! Далее, мы подробнее рассмотрим технологию, которая предлагает нам столько возможностей.

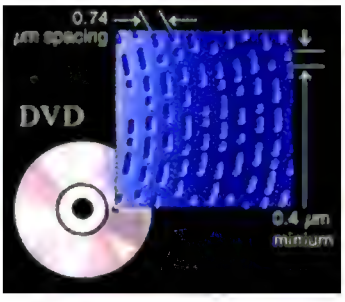
Основы устройства DVD

Как и CD-ROM, диски DVD хранят данные, за счет расположенных насечек вдоль спиральных треков на отражающей металлической поверхности, покрытой пластиком. Используемый в устройствах чтения DVD дисков лазер, скользит вдоль треков по насечкам, а отраженный луч интерпретируется приемным устройством в виде единиц или нулей.

Основное требование, при разработке DVD, было простым: увеличить емкость хранимых данных, за счет расположения как можно большего числа насечек вдоль треков на диске, при этом технология изготовления должна быть дешевой.

Результатом исследований стала разработка более высокочастотного полупроводникового лазера с меньшей длиной волны, в следствии чего стало возможным использовать насечки более маленького размера.





В то время, как лазер в обычном устройстве CD-ROM имеет длину волны 780-нанометров (nm), устройства DVD используют лазер с длиной волны 650-nm или 635-nm, что позволяет покрывать лучом в два раза больше насечек на одном треке, и в два раза больше треков, расположенных на одной записанной поверхности.

Другие нововведения - это новый формат секторов, более надежный код коррекции ошибок, и улучшенная модуляция каналов.

Вместе, эти улучшения дополнительно увеличивают плотность записи данных в полтора раза. Жесткие производственные требования и незначительно большая поверхность записи, стали последним препятствием, при разработке DVD, из-за чего емкость данных, размещаемых на диске ограничена 4.7Gb. Но оказалось, что это не предел.

Для записи видео и звука на DVD применяется очень сложная технология компрессии данных, носящая имя MPEG-2. MPEG-2 представляет из себя следующее поколении стандарта на сжатие (компрессию) видео и звуковых данных, обеспечивающего возможность разместить большие объемы информации в меньшем пространстве.

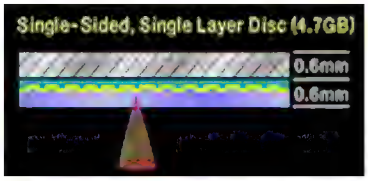
Стандарт сжатия MPEG разработан Экспертной группой кинематографии (Moving Picture Experts Group - MPEG). MPEG это стандарт на сжатие звуковых и видео файлов в более удобный для загрузки или пересылки, например через интернет, формат. По стандарту MPEG-1 потоки видео и звуковых данных передаются со скоростью 150 килобайт в секунду -- с такой же скоростью, как и односкоростной CD-ROM проигрыватель -- и управляются путем выборки ключевых видео кадров и заполнением только областей, изменяющихся между кадрами. К несчастью, MPEG-1 обеспечивает качество видеоизображения более низкое, чем видео, передаваемое по телевизионному стандарту.

Компрессия по стандарту MPEG-2 кардинально меняет положение вещей. Более 97% цифровых данных, представляющих видео сигнал дублируются, т.е. являются избыточными и могут быть сжаты без ущерба качеству изображения. Алгоритм MPEG-2 анализирует видеоизображение в поисках повторений, называемых избыточностью. В результате процесса удаления избыточности, обеспечивается превосходное видеоизображение в формате MPEG-2 при более низкой скорости передачи данных. По этой причине, современные средства поставки видеопрограмм, такие как цифровые спутниковые системы и DVD, используют именно стандарт MPEG-2.

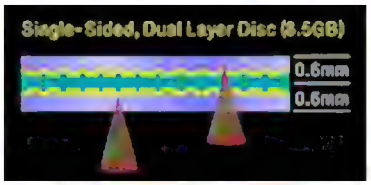
Множество поверхностей DVD

Большинство дисков DVD имеют емкость 4.7GB. Применение схем удвоения плотности и их комбинирования, позволяет иметь диски большей емкости: от 8.5Gb и 9.4Gb до 17Gb.

Существуют следующие структурные типы DVD:



Single Side/Single Layer (односторонний/однослойный): это самая простая структура DVD диска. На таком диске можно разместить до 4.7 Гб данных. Кстати, эта емкость в 7 раз больше емкости обычного звукового CD и CD-ROM диска

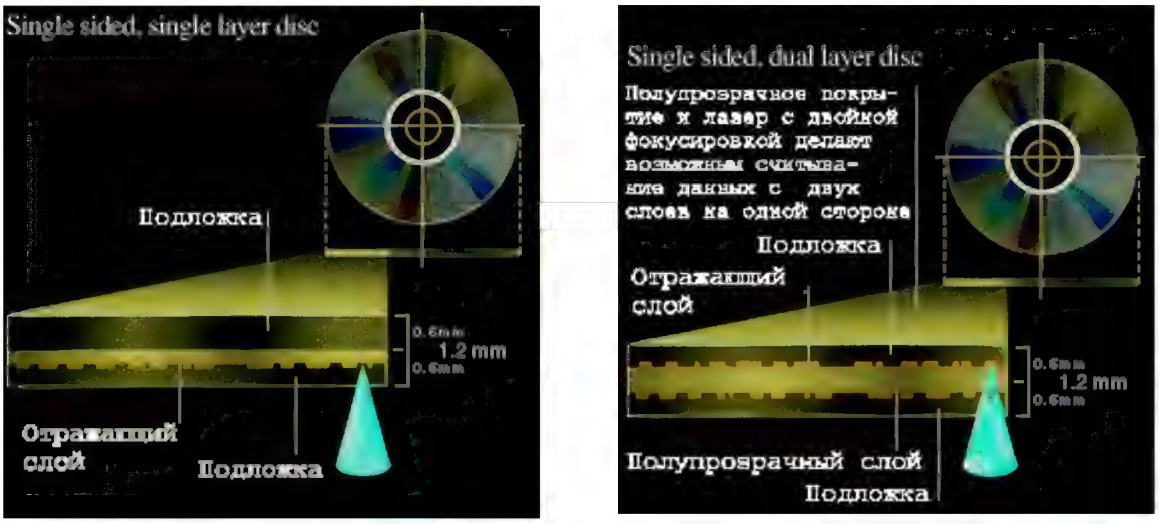


Single Side/Dual Layer (односторонний/двуслойный): этот тип дисков имеет два слоя данных, один из которых полупрозрачный. Оба слоя считываются с одной стороны и на таком диске можно разместить 8.5 Гб данных, т.е. на 3.5 Гб больше, чем на однослойном/одностороннем диске.

Double Side/Single Layer (двусторонний/однослойный): на таком диске помещается 9.4 Гб данных (по 4.7 Гб на каждой стороне). Нетрудно заметить, что емкость такого диска вдвое больше одностороннего/однослойного DVD диска. Между тем, из-за того, что данные располагаются с

двух сторон, придется переворачивать диск или использовать устройство, которое может прочитать данные с обеих сторон диска самостоятельно.
Double Side/Double Layer (двусторонний/двуслойный): структура этого диска обеспечивает возможность разместить на нем до 17 Гб данных (по 8.5 Гб на каждой стороне).

Заметим, что все приведенные цифры соответствуют емкости, указанной в миллионах байтов; если округлять по другой методике, принимая за основу, что 1Кб=1024 байта, а не 1000 байт, то получатся другие числа: 4.38GB, 7.95GB, 8.75GB, и 15.9GB соответственно.



Нетрудно заметить, что простейшим способом удвоения емкости является использование двухсторонних дисков. Производители могут изготавливать диски DVD толщиной 0.6мм, что в половину меньше толщины стандартного диска CD. Это дает возможность соединить два диска обратными сторонами и получить емкость в 9.4Gb.

По другой технологии, создается второй слой для размещения данных, это позволяет увеличить емкость одной стороны диска. Первый слой делается полупрозрачным, таким образом лазерный луч может проходить через него и отражаться уже от второго слоя. По этой схеме на каждой стороне дика можно разместить по 8.5GB данных.

Если сложить двуслойные диски обратными сторонами вместе, получится очень приличная емкость в 17GB.

Скорость передачи и время доступа

Существующие приводы DVD имеют несколько более медленную скорость вращения дисков, по сравнению с устаревшими устройствами CD-ROM с 3-х кратной скоростью. Однако, благодаря более плотному размещению данных на DVD, скорость их передачи соответствует 9-ти кратной скорости передачи данных приводов CD-ROM, что в цифрах соответствует передачи около 1.3 MB/sec.

Соль в том, что видео на DVD прокручивается приблизительно с 9-ти кратной скоростью, в то время, как видеопрограммы на CD обычно рассчитаны на 2-х или 4-х кратную скорость (вот почему при использовании x24 скоростного привода CD нет никакого заметного улучшения качества при проигрывании видео). За счет передачи видеоданных в 2.25-4.5 раза быстрее, видеофильм, показываемый с проигрывателя DVD имеет такое качество, что по сравнению с ним видео с CD-ROM проигрывателя напоминает мерцающее изображение в старинном кинотеатре. И действительно, если запустить один и тот же фильм с VideoCD, VHS или DVD, то разница в качестве будет заметна на глаз, причем однозначно выигрывает DVD. Более того, на мониторе DVD фильм смотрится лучше, чем на телевизоре.

Сейчас на рынке уже появились устройства чтения DVD дисков второго поколения, имеющие уже 2-х кратную скорость. Хотя это и не влияет на качество проигрываемого видео, зато увеличит скорость загрузки программного обеспечения с DVD-ROM.

Практически не изменилось положение только с одним важным параметром, влияющем на производительность: время доступа, или то время, которое требуется лазерному лучу для перехода с одного трека на другой. Имея среднее время доступа между 150 и 200 миллисекунд (ms), приводы DVD-ROM, конечно же, не могут соперничать с жесткими дисками, по скорости запуска приложений или времени поиска разрозненных данных.

Но это не трагично, т.к. время доступа не влияет на проигрывание видео, потому что в этом случае данные располагаются на диске последовательно.

Кроме того, DVD-ROM, так же, как и CD-ROM, прекрасно подходят для загрузки программ и в качестве большого хранилища данных для приложений, которые не помещаются на Ваш жесткий диск.

Запись на DVD

Это кажется невероятным, но уже появились устройства DVD-R и DVD-RAM, которые позволят Вам хранить данные на специальных записываемых или перезаписываемых дисках DVD.

Устройства DVD-RAM позволят Вам перезаписывать диски DVD-RAM много раз и первые образцы уже начали появляться на рынке. В нашей тестовой лаборатории был протестирован первый DVD-RAM от Hitachi.

Устройства DVD-R позволяют сделать лишь однократную запись. Кстати, с обоими этими стандартами пока не все в порядке. Уже в сентябре должны появится конкурирующие (и несовместимые с разработками Hitachi, Matsushita и Toshiba) продукты, создаваемые совместно Sony, Mitsubishi и Philips.

Но есть один нюанс: стандартные DVD-R и DVD-RAM диски могут хранить лишь 3.95GB и 2.58GB данных на каждой стороне соответственно, взамен 4.7GB предлагаемых на одной стороне обычных дисков DVD. Появление двуслойных дисков DVD-R и DVD-RAM ожидается еще очень не скоро. По крайней мере, предполагается, что лишь в конце 1999 года будут первые пробные образцы двуслойных дисков DVD-RAM, на одной стороне которых будет возможно разместить 4.7Gb данных.

Однако, все эти постоянные изменения в технологиях DVD, предоставляют разумному покупателю возможность сделать правильный выбор. Например, стоит ли делать покупку сейчас, когда Hitachi -- лидер в технологиях DVD -- обещает, что к 2001 году, благодаря использованию их технологии blue-laser (голубой лазер), на одном слое диска DVD будет помещаться 14Gb данных? Если Вас устраивает качество изображения, которое обеспечивает Ваш домашний видеомагнитофон, Вы играете в компьютерные игры и не используете обучающие программы, то стоит подождать, пока цены на DVD не упадут. Между тем, существующий уже сегодня формат DVD останется неизменным довольно долго. И Голливуд делает на это ставку. Кстати, в Москве уже можно купить лицензионные DVD диски с русским переводом.

Видео на DVD

Для декодирования MPEG-2 видео требуются мощные аппаратные средства -- такие, как специальная плата с декодирующим процессором, которая может поставляться с самим устройством DVD или процессор Pentium II, чья вычислительная мощь используется для программного декодирования.

Выход в свет Windows98 и доступность новых мощных процессоров безусловно будет способствовать широкому распространению DVD приводов, так как софтверное декодирование обеспечивает приемлемое качество изображения и звука. Программные декодеры можно купить у Xing, Zoran, CyberLink и т. д. или же вы можете использовать аппаратный декодер. Однако, если есть возможность, лучше использовать аппаратное декодирование.

Корпорации индустрии развлечений имеют две основные причины использовать DVD в качестве нового носителя для домашнего видео.

Первая заключается в том, что стоимость производства дисков DVD составляет лишь четверть от стоимости производства видеокассет.

Вторая заключается в том, что DVD обеспечивает высокое качество изображения, более яркое и впечетляющее, чем лазерный диск. Кроме того, DVD имеет такие преимущества, которые не может обеспечить пленка, это звук с качеством Dolby Digital (AC3) и возможность надежной защиты от копирования и нелегального использования.

Это все хорошие новости. Плохие новости состоят в том, что качество видео на DVD сильно зависит от того, кто изготовил диск и как декодируется формат MPEG-2. Некоторые прокатчики неправильно создают мастер-оригинал MPEG-2 видеозаписи. Поэтому, обязательно внимательно подходите к выбору фильм на DVD.

Более того, применение сложной схемы защиты от копирования, продвигаемая прокатчиками фильмов, может стать настоящим препятствием при считывании дисков DVD, произведенных различными компаниями.

DVD в действии

Как и следовало ожидать, устройства чтения DVD для использования в компьютере и плейеры для дома имеют управление, как у обычного видеомагнитофона. Но при этом имеют дополнительные возможности, такие, как сканирование диска и поиск фрагмента, пауза и замедленное проигрывание фильма.

Вы можете осуществлять покадровый просмотр вперед или назад, и каждый кадр будет иметь четкое изображение. Применение меню позволит Вам перескочить в любое место фильма, и Вы сможете изменять размеры изображения, т.е. иметь возможность растянуть его во весь экран или просто, как больше нравится.

Предусмотрена и специальная функция контроля, позволяющая родителям закрывать доступ детям к некоторым специфичным фрагментам видеофильма, например, к сценам с насилием.

Но настоящей вкусностью является большая емкость DVD дисков, в результате чего стало возможно применение многопотоковости данных. Например, Вы можете наслаждаться просмотром программ на различных языках, или даже продублированных на разных языках, причем перевод может быть и в виде субтитров. Используя пульт дистанционного управления или компьютерную программу у вас будет возможность выбора из 8 разных языков, причем со стерео звуком или вы сможете выбрать субтитры на одном из 32 возможных языков.

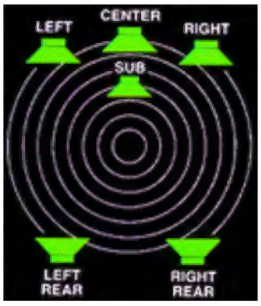
У вас будет возможность выбора различных сюжетных линий одного и того же фильма и различные варианты финалов, конечно, если это было предусмотрено.

Но более впечатляет то, что поставщики фильмов на DVD могут создавать программы с параллельными видеопотоками, т.е. Вы можете просматривать одни и те же сцены, но с разных углов зрения. Скажем, просматривая футбольный матч, Вы сможете переключаться с вида со стороны трибун, на виды со стороны вратаря или нападающего. Появляется возможность выступать в роли режиссера, при проигрывании специально созданных фильмов, где Вы сами будет выбирать фрагменты для просмотра.

Вы сможете выбрать любое из 9 возможных положений камеры, что бы с разных сторон посмотреть на одну и ту же сцену, конечно, все это должно быть заложено в специально сделанном, интерактивном, DVD диске.

Звук на DVD

Поставщики фильмов на DVD предлагают со своими программами поистине потрясающий звук, записанный по стандарту Dolby Digital (AC-3 Digital Sound), который обеспечивает пять + один звуковых каналов.



Если Вы были в современном кинотеатре или видели рекламу о звуке домашнего театра, то можете представить, о чем идет речь. В большинстве современных фильмах звуковой ряд записан в стандарте AC-3 5.1 channels, т.е. обеспечивается пять раздельных (дискретных) каналов и один общий низкочастотный канал. В отличии от стандарта Dolby ProLogic, многоканальный стандарт записи звука AC-3 рассчитан на то, что перед зрителем расположены три колонки (левая, права и центральна), за его спиной расположено еще два твитера (левый и правый), а в произвольном месте расположен сабвуфер (низкочастотная колонка, которую, впрочем, обычно тоже располагают впереди под центральной колонкой).

Запись звука по стандарту AC-3 дает возможность создателям звукового ряда для фильмов, после использования различных студийных спецэффектов, добиться того, что у зрителя создается полное ощущение реальности происходящего на экране действия.

Дискретная сущность звука Dolby Digital обеспечивает дополнительную четкость звучания (особенно важную при диалогах) и эффект объемного пространства. Звук, записанный по стандарту AC-3 может распространяться по помещению в произвольных направлениях, в результате чего и достигается эффект присутствия.

Как дополнительная возможность, на DVD можно записывать 16-, 20- или 24-битный стерео звук с качеством CD и частотой 48 КГц или 96 КГц по стандарту Dolby ProLogic.

Совместимость и защита авторских прав

Основной вопрос о совместимости прост: какое устройство DVD с каким компьютером работает? Устройства, которые предлагают Diamond и Creative Labs используют для считывания видеоданных технологию chroma-key. Вы можете установить их проигрыватели в любой компьютер на основе процессора Pentium-90 (или более можщном) с оперативной памятью 16 Мб и наличием 4 Мб свободного дискового пространства.

Устройство компании Hi-Val работает с любым компьютером на основе Pentium-133 (или более мощном), который оснащен видеоадаптером, поддерживающим спецификацию DirectDraw -- таким образом Hi-Val не может работать со старыми видеоплатами.

Сегодня, главная проблема - это совместимость с дисками DVD-RAM. Так такие диски размещаются в специальных картриджах, на манер магнитооптических дисков, то в обычный DVD-ROM проигрыватель они просто не помещаются. Правда, имеется информация, что производители просто углубят лоток у обычных DVD-ROM плейеров, как это сделано у устройств DVD-RAM. Так что, если вы планируете использовать диски DVD-RAM, но само устройство для их записи вам не нужно, стоит немного повременить с покупкой обычного считывающего DVD-ROM. Не исключено, что все изменится в лучшую сторону, причем, возможно, уже к осени.

Благодаря возможности DVD создавать отличные цифровые копии фильмов, кинокомпании подготовили комплекс мер по защите авторских прав. Основная их часть - это кодирование (шифрование) видеоданных, размещаемых на DVD, которые должны расшифровываться перед выводом изображения на экран -- что означает, в свою очередь, увеличение нагрузки на процессор для выполнения операции по дешифрованию.

Сейчас, наибольшее распространение получил такой способ защиты, как запись DVD диска для специальной зоны. Вообщем, весь мир поделили на 6 зон, и если у вас проигрыватель для первой зоны, то вы не сможете посмотреть на нем фильм, записанный для второй зоны. Правда, уже есть способы, изменить настройки аппаратуры, а в некоторых случаях, можно превратить плейер в мультизонный. А вот и сам список зон:

1. Северная Америка
2. Япония, Европа, Средний Восток, Южная Африка
3. Юго-восточная Азия (включая Гон-Конг)

4. Австралия, Новая Зеландия, Центральная и Южная Америка
5. Северо-западная Азия (Россия), Северная Африка
6. Китай

Остальные меры сводятся к применению в большинстве проигрывателей специальной электроники, которая должна препятствовать копирования фильма на видеомагнитофон. Этот способ защиты самый неприятный, т.к. похоже, что производители хотят контролировать процесс выпуска фильмов и их продажу. В результате, некоторые программы, купленные в одной части мира, могут не проигрываться на устройствах DVD, купленных в другой части мира.

Использованы материалы Samsung Electronics (http://www.sec.samsung.co.kr/)

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